

**BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA**

|  |   |  |
|--|---|--|
| In the Matter of:                          | ) | <b>DIRECT TESTIMONY OF</b>             |
| Application of Dominion Energy South       | ) | <b>ZHEN ZHU</b>                        |
| Carolina, Inc, for Adjustment of Rates and | ) | <b>For United States Department of</b> |
| Charges,                                   | ) | <b>Defense and All Other Federal</b>   |
| Docket Number 2020-125-E                   | ) | <b>Executive Agencies</b>              |

**November 10, 2020**

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**EXHIBIT No. \_\_ (ZZ) SCHEDULES**

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| Exhibit No.__(ZZ-1) | Dr. Zhu Resume                          |
| Exhibit No.__(ZZ-2) | Long-Term and Short-Term Interest Rates |
| Exhibit No.__(ZZ-3) | Capital Structure                       |
| Exhibit No.__(ZZ-4) | Constant Growth DCF                     |
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| Exhibit No.__(ZZ-7) | CAPM                                    |
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**DIRECT TESTIMONY  
OF ZHEN ZHU, Ph.D.  
ON BEHALF OF UNITED STATES DEPARTMENT OF DEFENSE AND ALL  
OTHER FEDERAL EXECUTIVE AGENCIES  
BEFORE SOUTH CAROLINA PUBLIC SERVICE COMMISSION  
DOCKET NO. 2020-125-E**

## I. INTRODUCTION

2 Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

3     A.     My name is Zhen Zhu. I am a Managing Consultant. My business address is  
4     5555 North Grand Blvd., Oklahoma City, Oklahoma 73112.

5 Q. BY WHOM ARE YOU EMPLOYED?

6     A.     I am employed by C. H. Guernsey & Company. I am also the Dr. Michael  
7     Metzger Chair Professor of Economics at the University of Central Oklahoma.

8 Q. WHAT IS YOUR EDUCATIONAL BACKGROUND?

9     A.     I have a B.A. in Business Administration from Renming University in China,  
10           an M.A. in Economics from Bowling Green State University, and a Ph.D. in  
11           Economics from the University of Michigan.

12 Q. PLEASE DESCRIBE YOUR PROFESSIONAL BACKGROUND.

13     A.     From 2000 to present, I have been an Economist, Consultant, Senior Consultant  
14             and Managing Consultant with C.H. Guernsey and Company. From 1994 to  
15             2000, I was an Assistant Professor of Economics at the University of Oklahoma.  
16             From 2000 to present, I have been an Assistant, Associate, Professor,  
17             Department Chairperson, and the Dr. Michael Metzger Chair Professor of

1 Economics at the University of Central Oklahoma. I have performed many  
2 academic and applied studies of the energy market and of regulatory policy,  
3 along with studies of international financial markets and commodity markets.  
4 Please refer to Exhibit No. \_\_\_\_ (ZZ-1) for a list of my more recent publications  
5 and studies.

6 Q. WHAT IS YOUR REGULATORY EXPERIENCE?

7 A. As a consultant, I have performed a variety of research studies, provided direct  
8 testimony, support, and engagement in many projects related to gas and electric  
9 utility regulatory matters. I have provided support and testimony in gas and  
10 electric cost of capital cases. I have also provided testimonies on issues related  
11 to Integrated Resource Planning, natural gas prices, and load forecasts before a  
12 number of regulatory bodies.

13 Q. BEFORE WHAT REGULATORY AUTHORITIES HAVE YOU TESTIFIED  
14 AS AN EXPERT WITNESS?

15 A. I have testified before the Michigan Public Service Commission, Georgia  
16 Public Service Commission, Oklahoma Corporation Commission, and South  
17 Carolina Public Service Commission.

18 Q. WHAT IS THE NATURE OF YOUR TESTIMONY IN THIS CASE AND ON  
19 BEHALF OF WHOM YOU ARE TESTIFYING?

20 A. Dominion Energy South Carolina, LLC (DESC or Company), a subsidiary of  
21 Dominion Energy (DE), filed an application with the South Carolina Public  
22 Service Commission (SC PSC or Commission) to adjust and increase its rates  
23 and charges for retail electric service in South Carolina. In the filing, the

1 Company's cost of capital witness, Dr. James H. Vander Weide, provided direct  
2 testimony regarding the Company's cost of capital.

3 I was asked by the United States Department of Defense and all other  
4 Federal Executive Agencies (DoD/FEA) to provide an independent evaluation  
5 of the cost of capital in this case, and to provide a response to Dr. Vander  
6 Weide's testimony.

7 Q. PLEASE DESCRIBE THE ORGANIZATION OF YOUR TESTIMONY.

8 A. First I describe the standard in setting the cost of capital and the general  
9 principles in calculating the cost of the capital. I also examine the current state  
10 of the economy and capital markets because economic and capital market  
11 conditions set a global environment for firms to operate, thus influencing the  
12 value of cost of capital. I then describe the capital structure and cost of debt. I  
13 provide evidence to support my recommendations regarding capital structure.  
14 Next, I detail the calculation of the cost of equity by using several generally  
15 accepted methodologies. Specifically, I calculate the Company's cost of equity  
16 by applying a Constant Growth Discounted Cash Flow (DCF) model and  
17 Capital Asset Pricing Model (CAPM) to a group of proxy companies. I also  
18 provide a form of risk premium (RP) analysis using the past authorized Return  
19 on Equity (ROE) and interest rate. After carrying out these calculations, I  
20 provide my recommendation regarding the Company's cost of capital. Finally,  
21 I provide a critical review of the Company's witness Dr. Vander Weide's ROE  
22 methodologies and results.

1 Q. PLEASE SUMMARIZE HOW YOU DEVELOPED YOUR RETURN ON  
2 EQUITY RECOMMENDATION FOR DESC.

3 A. I reviewed the Company's financial conditions including the cost of debt and  
4 capital structure. I calculated the cost of equity for a group of comparable  
5 companies based on several different models. The models I used include a  
6 Constant Growth DCF model. Contrary to Dr. Vander Weide's one-step DCF  
7 method, I used a two-step methodology that considers a long-term Earnings Per  
8 Share (EPS) growth rate as represented by Gross Domestic Product (GDP)  
9 growth rate. In addition, I calculated the required cost of capital based on the  
10 CAPM. In applying the CAPM model, I used a measure of market risk premium  
11 obtained by applying a forward-looking DCF model to companies in the S&P  
12 500 market index to generate expected market return. Finally, I used a form of  
13 bond yield plus Risk Premium (RP) model to produce another measurement of  
14 ROE to support my cost of capital recommendation.

15 Q. PLEASE SUMMARIZE YOUR TESTIMONY AND  
16 RECOMMENDATIONS.

17 A. Company witness, Dr. Vander Weide, made a cost of equity recommendation  
18 of 10.4%. The Company lowered it to 10.25%, which is the same ROE ordered  
19 by the Commission from the last rate case (2012 rate case). An ROE of 10.25%,  
20 or 10.4%, is too high and unsupported by current economic and capital market  
21 conditions. There are many issues and problems associated with Dr. Vander  
22 Weide's assumptions and methodologies used in the process of obtaining such  
23 a high cost of equity. These issues include, but are not limited to, using

1 forecasted interest rates in lieu of actual market interest rates, adjusting the ROE  
 2 upward by applying market value capital structure, inclusion of flotation costs,  
 3 and applying a book value based Comparable Earnings (CE) model. I will detail  
 4 these points in the later parts of my testimony.

5 My calculations indicate that the Company's required cost of equity, or  
 6 the opportunity cost of equity, is much lower than the Company's request of  
 7 10.25%. I make a ROE recommendation of 9.1%. This recommendation is  
 8 based on my calculations from several financial models including the DCF,  
 9 CAPM and RP models. Table 1 below provides a summary of my model results.  
 10 These models generated median estimates between 8.57% and 9.48%, with the  
 11 overall mean ROE of 9.0% from all three models, an average median of 9.03%  
 12 based on the DCF and CAPM models, and a midpoint of DCF and CAPM  
 13 estimates 9.01%. Thus, I make a ROE recommendation of 9.1%.

| Table 1: Summary of ROE |        |        |                 |         |
|-------------------------|--------|--------|-----------------|---------|
| Model                   | DCF    | CAPM   | Risk<br>Premium | Average |
| Lower End               | 5.55%  | 6.14%  |                 | 5.85%   |
| Upper End               | 12.46% | 11.87% |                 | 12.16%  |
| Median                  | 8.57%  | 9.48%  |                 | 9.03%   |
| Average                 | 8.57%  | 9.72%  | 8.73%           | 9.00%   |
| Midpoint                | 9.01%  | 9.01%  |                 | 9.01%   |

15  
 16 I accept the Company's embedded overall long-term weighted average cost of  
 17 debt of 6.46%. The Company also requested a capital structure of 53.35%  
 18 equity and 46.65% debt, which is higher than the capital structure that is  
 19 common among the comparable companies. In addition, the Company used a



hypothetical equity ratio based on data as of May 30, 2020.<sup>1</sup> The Company should use the capital structure in the test year. Based on my analysis of capital structure of comparable companies, I recommend the use of the Company's actual equity ratio at the end of the test year 2019, which is 52.56% - 47.44% equity-debt structure. Therefore, given the capital structure, cost of debt, and cost of equity, my recommended overall cost of capital is 7.85%. Table 2 below shows the summary of overall cost of capital.

| Table 2: Overall Cost of Capital |        |       |                                     |
|----------------------------------|--------|-------|-------------------------------------|
|                                  | Ratio  | Cost  | Weighted Average<br>Cost of Capital |
| Debt                             | 47.44% | 6.46% | 3.06%                               |
| Equity                           | 52.56% | 9.10% | 4.78%                               |
| Total                            | 100%   |       | 7.85%                               |

Capital structure as of Dec 31, 2019

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes, I am sponsoring the following exhibits:

Exhibit No.\_\_(ZZ-1): Dr. Zhen Zhu's resume

Exhibit No.\_\_(ZZ-2): Long-term and short-term interest rates

Exhibit No.\_\_(ZZ-3): Capital structure

Exhibit No.\_\_(ZZ-4): Constant growth DCF model

Exhibit No.\_\_(ZZ-5): Nominal GDP growth

Exhibit No.\_\_(ZZ-6): Market risk premium

<sup>1</sup> See Chart A on page 10 of Direct Testimony of Iris, N. Griffin.

1 Exhibit No.\_\_(ZZ-7): CAPM model

2 Exhibit No.\_\_(ZZ-8): Risk premium model

3 Q. DID YOU OR SOMEONE UNDER YOUR DIRECT SUPERVISION  
4 PREPARE THESE EXHIBITS?

5 A. Yes.

6

7 II. REGULATORY STANDARD AND METHODOLOGY OF THE ANALYSIS

8 Q. WHAT IS THE PURPOSE OF ESTABLISHING A RATE OF RETURN  
9 WHEN SETTING A UTILITY'S RATES?

10 A. The purpose of a rate of return, also commonly called a "cost of capital" or  
11 "opportunity cost of capital," is to compensate investors who have committed  
12 capital to finance necessary plant and equipment for utility service to customers.  
13 Investors commit these funds in anticipation of earning a return on their  
14 investment that is consistent with that of other investment alternatives with  
15 comparable risks. This regulatory standard is well recognized and was  
16 addressed by the U.S. Supreme Court in the cases of *Bluefield Water Works &*  
17 *Improvement Co.* (1923) and *Hope Natural Gas Co.* (1944). It provides the  
18 utility an opportunity to earn a rate of return sufficient to: (1) fairly compensate  
19 capital currently invested in the utility; (2) enable the utility to attract new  
20 capital on reasonable terms; and (3) maintain the utility's financial integrity.

21 Q. HOW DOES THE SOUTH CAROLINA PUBLIC SERVICE COMMISSION  
22 RECOGNIZE THIS PRINCIPLE?

1 A. The Commission fully recognizes the principles of rate making behind the  
2 *Bluefield* and *Hope* cases. In Order No. 2019-341, the Commission affirmed:<sup>2</sup>

3 The Commission and the South Carolina courts have consistently  
4 applied the principles set forth in *Bluefield* and *Hope*, *Southern Bell*  
5 *Tel. & Tel. Co. v. Pub. Serv. Comm'n*, 270 S.C. 590 (1978).  
6 Quoting *Hope*, the South Carolina Supreme Court held: "... Under  
7 the statutory standard of 'just and reasonable' it is the result  
8 reached, not the method employed, which is controlling... The  
9 ratemaking process under the Act, i.e., the fixing of 'just and  
10 reasonable' rates, involves the balancing of investor and the  
11 consumer interests." *Federal Power Comm'n v. Hope Natural gas*  
12 *Co.*, 320 U.S. 591, 602-03 (1944).

13  
14 Furthermore, the Commission stated:<sup>3</sup>

15 This Commission must exercise its dual responsibility of  
16 permitting utilities an opportunity to earn a reasonable return  
17 on the property it has developed to servicing the public, on  
18 the one hand, and protecting customers from rates that are so  
19 excessive as to be unjust and unreasonable, on the other, by  
20 (a) Not depriving investors of the opportunities to earn  
21 reasonable returns on the funds devoted to such as that would  
22 constitute a taking of private property without just  
23 compensation, and (b) Not permitting rates which are  
24 excessive.  
25

26 The Commission fully realizes the importance of balancing the interests of  
27 investors and customers.

28 Q. DOES THE REGULATORY STANDARD INCLUDE GUIDELINES ON  
29 SETTING A COMPANY'S RATES?

30 A. Yes. Utilities are a natural monopoly. If left unregulated, companies in the  
31 utility industry have every incentive to charge customers prices that maximize

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<sup>2</sup>Order No. 2019-341, by PSC of SC in the Application of Duke Energy Progress, LLC, for adjustments in electric rate schedules and tariffs, Docket No. 2018-318-E, May 21, 2019. Page 21.

<sup>3</sup> Order No. 2019-341, by PSC of SC in the Application of Duke Energy Progress, LLC, for adjustments in electric rate schedules and tariffs, Docket No. 2018-318-E, May 21, 2019. Page 22.

1 the company's profit. The amount of product that a utility would provide to the  
2 customers would be at a level that is lower than socially optimum, and the price  
3 will be higher than the price level of a perfectly competitive industry. Thus,  
4 utility firms are typically regulated by jurisdictional authorities. The  
5 jurisdictional authorities set rules to make sure that customers will be able to  
6 obtain services at reasonable rates and customers will not be charged too high  
7 a price. In the meantime, utilities would still earn a fair return for their investors,  
8 and they can make investments for the long-term benefit of the consumers.  
9 Standards have been set from these guidelines:

10 1. The most important factor in determining the required return on  
11 equity of a utility is risk. Utilities face smaller degrees of risk compared to most  
12 other businesses; a utility's return, therefore, should be lower than other riskier  
13 businesses.

14 2. Utilities should earn returns comparable to other businesses with  
15 similar degrees of risk in order to maintain their financial soundness, including  
16 maintaining their credit standing, and attracting capital for investment.

17 These guidelines ensure that utility customers receive adequate service  
18 at a reasonable price and companies make reasonable returns on their  
19 investment.

20 To this effect, the Commission stated:<sup>4</sup>

21 These decisions hold that (1) a regulated public utility is  
22 entitled to rates that allow it the opportunity to earn a return on

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<sup>4</sup> Order No. 2019-341, by PSC of SC in the Application of Duke Energy Progress, LLC, for adjustments in electric rate schedules and tariffs, Docket No. 2018-318-E, May 21, 2019. Page 32.

1 its invested capital that is equal to that being made at the same  
2 time and in the same general part of the country of other  
3 investments in business undertakings with similar risks and  
4 opportunities, (2) the return should be such as to assure  
5 confidence in the financial soundness of the utility and  
6 adequate, under efficient and economic management, to  
7 maintain and support its credit and enable it to raise money  
8 necessary for proper discharge of its duties, (3) the utility has  
9 no right to the kinds of profits that may be realized in highly  
10 profitable enterprises.

11  
12 Q. IS YOUR ESTIMATION OF REQUIRED RETURN BASED ON THESE  
13 STANDARDS?

14 A. Yes, my estimation of the required return on equity is based on these standards.  
15 I recommend the Commission award a ROE based on the required market return  
16 so the Company can maintain its financial integrity. In the meantime, utility  
17 customers can obtain the service at a reasonable cost.

18 Q. WHAT ANALYTICAL METHODOLOGY DO YOU EMPLOY IN THIS  
19 CASE TO ANALYZE DESC'S COST OF CAPITAL?

20 A. DESC is not an independent, publicly traded company. It is a subsidiary of  
21 Dominion Energy, which means that DESC's financial condition is not  
22 regularly reported to the market. However, the standard cost of capital analysis  
23 still applies – potential investors will consider the expected financial returns on  
24 an investment in comparison to the market returns on other available  
25 alternatives. DESC operates in the general economic and industry environment,  
26 thus its financial performances are also related to the overall economic and  
27 industry performances. For this reason, my analysis was broad in scope. I  
28 studied the underlying economic environment, Federal Reserve policy,

1 investors' likely expectation of the future returns, and the utility industry's  
2 expected returns in the current market.

3 Q. HOW DID YOU TAKE MARKET RISKS INTO ACCOUNT WHEN  
4 PERFORMING THE COST OF CAPITAL ANALYSIS FOR DESC?

5 A. I utilized standard DCF, CAPM, and Risk Premium methodologies to evaluate  
6 a group of comparable companies. In particular, the CAPM model and the RP  
7 model take the market risk explicitly into consideration. Financial theory  
8 suggests that investors are compensated for bearing systematic market risks, but  
9 not individual company risks. Even though it can be argued that DESC may  
10 face some unique risks like every company does, it is the systematic market risk  
11 (such as risks associated with market-wide environmental policies, regulations,  
12 general capital market, economic conditions, etc.) DESC faces that should be  
13 taken into consideration. This risk-reward principle is the basis for the analysis  
14 of required cost of capital for the company, as in other industries. In addition,  
15 the risk premium methodology recognizes a relationship between interest rate  
16 and a risk premium based on the utilities' authorized ROE and market interest  
17 rate. I will go over the detailed methodologies in later sections.

18 Q. DO YOU BELIEVE ANY OF THE MODELS YOU USED ARE BETTER  
19 THAN THE OTHERS?

20 A. Economic models are theories describing the real world. The models have their  
21 underlying assumptions and focus more on specific aspects of the markets than  
22 others. As market conditions are complicated, it is difficult for any single  
23 economic/financial model to capture all aspects of the expected returns of the

1 investors. In this sense, a combination of models gives a better measurement of  
2 the expected returns of the investors. The recent Federal Energy Regulatory  
3 Commission (FERC) Opinion No. 569-A clearly recognizes this need to  
4 incorporate more than one model to determine the expected ROE: “We continue  
5 to find that ROE determinations should consider multiple models, both to  
6 capture the variety of models used by investors and to mitigate model risk.”<sup>5</sup>

7 I agree with FERC’s policy statement.

8 In the past, this Commission has considered the evidence on ROE  
9 presented by the use of several standard models such as DCF, CAPM and RP  
10 models.<sup>6</sup>

11 Q. DID YOU SELECT A PROXY GROUP FOR THE ESTIMATION OF THE  
12 COMPANY’S RETURN ON EQUITY?

13 A. Yes, DESC is a subsidiary of Dominion Energy and it is not publicly traded. A  
14 conventional approach for companies like DESC is to select a proxy group of  
15 comparable companies, which would enable a reliable analysis that avoids the  
16 potential bias associated with a small set of companies. Therefore, I have  
17 selected a group of electric utility companies that are similar to the target  
18 company, DESC.

19 Q. WHAT CRITERIA DID YOU RELY ON TO SELECT THE GROUP OF  
20 COMPARABLE COMPANIES WHEN YOU PERFORMED THE  
21 ANALYSIS OF THE COST OF CAPITAL FOR DESC?

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<sup>5</sup> FERC Opinion N0. 569-A Order on Rehearing (Issued May 21, 2020), par 43.

<sup>6</sup> E.g., South Caroline Public Service Commission, Docket No. 2018-318-E – Order No. 2019-341, in  
re: Application of Duke Energy Progress, LLC for Adjustments in Electric Rate Schedules and Tariffs.  
Dominion Energy South Carolina, DOCKET NO. 2020-125-E

Witness: ZZ

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1 A. I selected electric distribution utility companies that are representative of the  
2 risk characteristics of DESC. I selected companies that are publicly traded and  
3 whose main business is electric distribution and selling to end-users. The  
4 starting list is comprised of the electric utility companies by *Value Line*. I  
5 avoided companies that were involved in mergers as the stocks of those  
6 companies would be evaluated by investors differently than under normal  
7 market conditions. I have also excluded companies that had reduced or halted  
8 dividend payment and companies that have negative dividend growth  
9 projections for my DCF analysis; but I included those companies in my study  
10 of ROE using the CAPM model. As the principles of utility rate making requires  
11 a return comparable to that of companies with similar risk, I have used DESC's  
12 bond rating to select the proxy companies.

13 Q. WHY DID YOU USE *VALUE LINE*-LISTED COMPANIES AS A  
14 STARTING POINT FOR THE SELECTION OF THE COMPARABLE  
15 COMPANIES?

16 A. *Value Line* represents a respected, broadly available, and specialized source of  
17 financial information. In addition, *Value Line* provides an independent source  
18 of information for the investment community because it does not have any  
19 financial interest in the companies it covers.

20 Q. PLEASE EXPLAIN WHY YOU SELECTED COMPANIES WITH SIMILAR  
21 BOND RATINGS TO DESC.

22 A. Bond ratings provide a measurable metric that the capital market can use to  
23 evaluate the overall risks of a utility company and that bond investors utilize to



1 assess the risks of default related to the investment. However, as the ratings  
2 consider all the risk factors faced by both the bond and equity investors, in my  
3 opinion, bond ratings provide an extremely useful information set that all  
4 investors utilize to make their investment decision. For example, when a  
5 company's bond ratings are changed unexpectedly, equity investors react to that  
6 news significantly as well, not just the bond investors. FERC also uses utility  
7 bond ratings to select the companies in the proxy group.

8 Q. WHAT IS THE BOND RATING OF DESC?

9 A. The long-term bond rating of DESC by Moody's is Baa2 and the ratings by  
10 S&P is BBB+. Both agencies have rated DESC similarly with a majority of the  
11 utilities in the comparable group. In order to include as many similar companies  
12 as possible, I have expanded the selection criterion to those companies that have  
13 the Moody's ratings of Baa1 and Baa3, and also the S&P ratings of A- and  
14 BBB, resulting in 33 companies being included in my proxy group (Zhu proxy  
15 group). Dr. Vander Weide's sample group contains essentially the same set of  
16 companies with only a few differences. I also present results using Dr. Vander  
17 Weide's sample (Vander Weide proxy group).

18 Q. PLEASE LIST THE GROUP OF ELECTRIC DISTRIBUTION UTILITIES  
19 THAT YOU IDENTIFIED FOR THE PROXY GROUP.

20 A. I selected the following regulated electric utilities:

21 Allele Inc

22 Alliant Energy Corp

23 Ameren Corp

- 1 American Electric Power Company Inc
- 2 AVANGRID Inc.
- 3 Avista Corp
- 4 Black Hills Corp
- 5 CenterPoint Energy
- 6 CMS Energy Corp
- 7 Consolidated Edison Inc
- 8 Dominion Energy
- 9 DTE Energy Company
- 10 Duke Energy Corp
- 11 Edison International
- 12 Entergy Corp
- 13 Evergy
- 14 Eversource Energy
- 15 Exelon Corp
- 16 FirstEnergy
- 17 Fortis Inc
- 18 Hawaiian Electric Industries Inc
- 19 IDACORP Inc
- 20 NextEra Energy
- 21 NorthWestern Corporation
- 22 OGE Energy Corp
- 23 Otter Tail Corp

1 PNM Resources  
2 PPL Corporation  
3 Public Service Enterprise Group Inc  
4 Sempra  
5 Southern Co  
6 WEC Energy Group  
7 Xcel Energy Inc

8 Most companies in this list are also in the list of the Company witness  
9 Dr. Vander Weide, who has 32 companies in the group, except that I have  
10 excluded three companies that have higher credit ratings: MGE Energy,  
11 Pinnacle West And Portland General from Dr. Vander Weide's group.

12 II. THE GENERAL ECONOMIC CONDITION

13 Q. COULD YOU EXPLAIN HOW ECONOMIC CONDITIONS CAN AFFECT  
14 THE COST OF CAPITAL OF DESC AT THE PRESENT TIME?

15 A. The public utility industry is characterized by large capital investment because  
16 it is capital-intensive. The most relevant economic variables to the cost of  
17 capital are interest rate and expected inflation, as both are critical factors  
18 considered by investors to set their expected returns when making investment  
19 decisions. As in standard economic theory, what matters to investors is the real  
20 return. Both the interest rate and expected inflation influence the real return on  
21 investment directly.

22 In the current economic environment, both interest rate (especially the  
23 short-term interest rate) and expected inflation are influenced by Federal

1 Reserve economic policies and its accompanying actions in the financial market  
2 to achieve its set objectives, even though economic variables can be influenced  
3 to different degrees.

4 Q. WHAT ARE THE FEDERAL RESERVE'S OBJECTIVES AND ACTIONS  
5 IN THE CURRENT ECONOMIC CONDITIONS?

6 A. In the past at the onset of, and during the recession, the Federal Reserve  
7 provided mostly short-term credit to add liquidity to the market to counteract  
8 the effect of recession. In the early period of the recovery from the 2008-2009  
9 recession, the Federal Reserve continued its accommodative monetary policy  
10 as the unemployment level was still higher than the objective set by the Federal  
11 Reserve. For example, the Federal Reserve stated in its July 2013 Monetary  
12 Policy Report:<sup>7</sup>

13 With unemployment still well above normal levels and inflation  
14 below its longer-run objective, the Federal Open Market  
15 Committee (FOMC) has continued its highly accommodative  
16 monetary policy this year by maintaining its forward guidance  
17 with regard to the target for the federal funds rate and continuing  
18 its program of large-scale asset purchases.

19  
20 The Federal Reserve's monetary easing has injected a large amount of liquidity  
21 to the financial market.

22 The Federal Reserve started to scale back its quantitative easing, or  
23 accommodative monetary policy, due to improvement in labor market  
24 conditions in 2014. As the U.S. economy continued to cruise through  
25 expansion, the Federal Reserve has changed its policy stance from being

---

<sup>7</sup> [http://www.federalreserve.gov/monetarypolicy/mpr\\_20130717\\_part2.htm](http://www.federalreserve.gov/monetarypolicy/mpr_20130717_part2.htm)

1 accommodative to tightening. In 2019, however, the Federal Reserve cut  
2 interest rates three times to fend off possible slowdowns in the U.S. economy  
3 brought on by the trade wars between China and the U.S.

4 Q. WHAT ARE SOME OF THE MAJOR CONSEQUENCES OF THE  
5 FEDERAL RESERVE'S RECENT POLICIES?

6 A. The injection of a large amount of liquidity into the financial market before  
7 2019 has caused short-term interest rates to fall to a historically low level. In  
8 addition, the short-term interest rates are cyclical as they respond to the Federal  
9 Reserve's monetary policy manipulations, but the long-term interest rate is  
10 significantly less so. I illustrate this in Exhibit No.\_\_\_\_(ZZ-2).

11 Exhibit No.\_\_\_\_(ZZ-2) shows that the short-term interest rate, in this  
12 case the 3-month Treasury-bill yield, fluctuated in response to business cycle  
13 and the monetary policy change. For example, at the onset of the last recession,  
14 when the Federal Reserved adopted Quantitative Ease (QE), the short-term  
15 interest rate dropped precipitously to a level that was almost zero; however, the  
16 long-term interest rate, in this case the 30-year Treasury bond yield continued  
17 its downward trend. One can hardly see its cyclical behavior. However, through  
18 all its movement, a downward trend is clearly observable. Until more recently,  
19 the Federal Reserve started to relax its QE policy, the short-term interest rate  
20 responded by going up from almost 0.0% to over 2%, before declining again as  
21 the Federal Reserve started to cut interest rates to offset the impact of COVID-  
22 19 on the U.S. economy. However, the long-term interest rate shows no obvious  
23 sign of responding to the Federal Reserve's monetary policy changes.

1 Another possible consequence of the Federal Reserve's monetary  
2 accommodation policy is inflation. If the monetary policy does not tighten in a  
3 timely fashion in response to economic expansion, then it creates upward  
4 pressure on the inflation; however, there is no evidence of expected inflation  
5 rate change and the market expectation of inflation is quite stable. For example,  
6 the Federal Reserve September 20, 2017 Statement<sup>8</sup> reported:

7 On a 12-month basis, overall inflation and the measure  
8 excluding food and energy prices have declined this year and  
9 are running below 2 percent. Market-based measures of  
10 inflation compensation remain low; survey-based measures  
11 of longer-term inflation expectations are little changed, on  
12 balance.

13  
14 In its November 5, 2020 Press Release, the Federal Reserve Board stated<sup>9</sup>:

15 The Committee seeks to achieve maximum employment  
16 and inflation at the rate of 2 percent over the longer run.  
17 With inflation running persistently below this longer-run  
18 goal, the Committee will aim to achieve inflation  
19 moderately above 2 percent for some time so that inflation  
20 averages 2 percent over time and longer-term inflation  
21 expectations remain well anchored at 2 percent. The  
22 Committee expects to maintain an accommodative stance  
23 of monetary policy until these outcomes are achieved.  
24

25 The Federal Reserve is expected to continue its policy stance to maintain  
26 maximum employment and low inflation objectives.

27 Q. HOW WILL THE CONSEQUENCES OF THE FEDERAL RESERVE'S  
28 POLICY CONCERN INVESTORS?

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<sup>8</sup> <https://www.federalreserve.gov/newsevents/pressreleases/monetary20170920a.htm>

<sup>9</sup> <https://www.federalreserve.gov/newsevents/pressreleases/monetary20201105a.htm>

1 A. Investors are concerned about their investment returns. The Federal Reserve  
2 increased the money supply to add liquidity to the financial market, but it will  
3 need to decrease the money supply in order to drain the liquidity and reduce  
4 inflation pressure. A reduction in the money supply will cause short-term  
5 interest rates to increase, as has already begun since late 2015 until late 2019.  
6 It is also shown in Exhibit No. \_\_\_\_ (ZZ-2).

7 Q. WHEN THE FEDERAL RESERVE TIGHTENS MONEY SUPPLY AND  
8 SHORT-TERM INTEREST RATE INCREASES, DO THE REQUIRED  
9 RETURNS FOR INVESTORS INCREASE?

10 A. Not necessarily. There are two kinds of interest rates in the marketplace: short-  
11 term interest rates and long-term interest rates. In the case of determining  
12 required returns for investors, it is the long-term interest rates that matter.  
13 Investors in the utility industry face long-term investment decisions rather than  
14 short-term investment decisions. In this consideration, how the short-term  
15 interest rates fare is less relevant to them.

16 As the Federal Reserve tightens the money supply, interest rates  
17 generally will increase; however, the Federal Reserve policies that were used  
18 to counteract business cycles are generally considered short-term policies and  
19 they mainly influence short-term interest rates. As I discussed above, the short-  
20 term interest rates are very responsive to the Federal Reserve policy, while the  
21 long-term interest rates (such as 30-year Treasury-bond yield) are not  
22 responsive to the QE policy or tightening monetary policy. For this reason, it is

1 not expected that the monetary policy stance will have much effect on the long-  
2 term interest rates, and thus, the required return on capital.

3 It is critically important to note that the long-term interest rates have  
4 been declining, irrespective of the monetary policy during the business cycles.  
5 And it is the long-term interest rates that matter to investors. Therefore, I believe  
6 that the current monetary policy, or the future monetary policy that targets  
7 short-term economic fluctuations, has little effect on the required return on  
8 equity. It is erroneous to argue that an interest rate increase leads to higher  
9 required cost of capital without distinguishing between short-term interest rates  
10 and long-term interest rates.

11 Q. ARE THERE ANY REASONS FOR THE STEADY DECLINE IN THE  
12 LONG-TERM INTEREST RATES IN THE LAST 40 YEARS?

13 A. Yes, many economic factors have contributed to the long-term decline of long-  
14 term interest rates. Professors and Economists Obstfeld and Tesar, in an article  
15 they wrote when they were serving on the Council of Economic Advisers under  
16 President Obama, have summarized these factors succinctly. They named the  
17 following factors whose effects on interest rates are likely to be transitory:

- 18 • Fiscal, monetary, and exchange rate policies
- 19 • Inflation risk and the term premium
- 20 • Private-sector deleveraging

21 They also named some factors that are likely longer-lived:

- 22 • Lower long-run growth in output and productivity
- 23 • Shifting demographics



- The global saving glut
- Shortage of safe assets
- Tail risks and “unknown unknowns”

In conclusion, they suggest “there is no definitive answer to how long current long-term interest rates will persist and whether they will settle at levels below those previously expected. Most factors, however, suggest that long-term interest rates will be lower in the long run compared with their levels before the financial crisis.”<sup>10</sup>

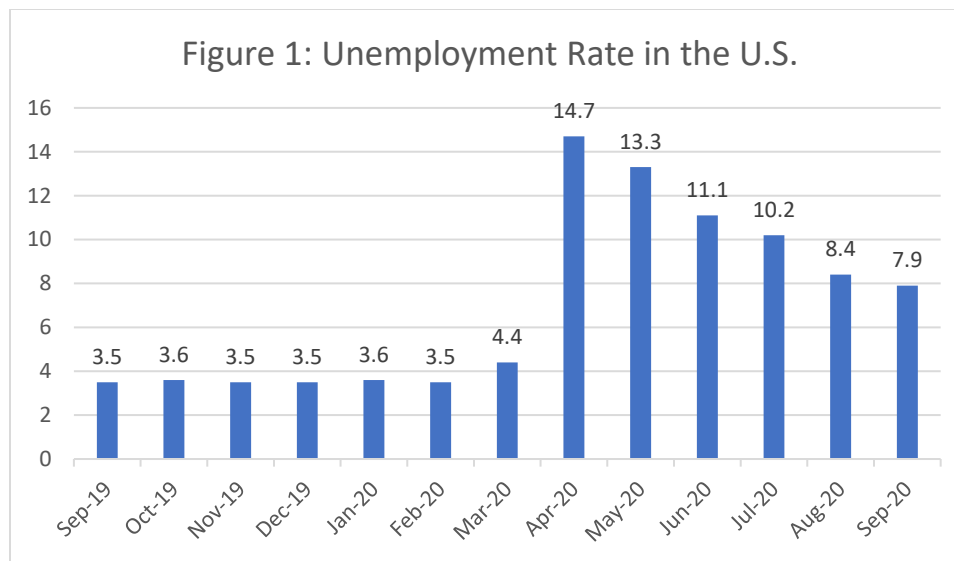
Q. HOW HAS THE FEDERAL RESERVE RESPONDED TO COVID-19?

A. Since its outbreak in Wuhan, China on December 31, 2019 and subsequent identification as the COVID-19 virus, commonly referred to as the Coronavirus, close to 7.7 million known infections and 213,000 deaths have occurred as of October 11, 2020.

The impact on the U.S. financial markets has been severe. Since all-time highs in February 2020, the Dow Jones Industrial Average, NASDAQ Composite, and S&P 500 Index have once declined approximately 27%, 25%, and 30%, respectively. As a result, the U.S. equity markets have lost \$11.5 trillion in capitalization since peaking in February 2020. In April 2020, the U.S. unemployment rate reached 14.7%, followed by gradual declines in subsequent months (see Figure 1 below).

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<sup>10</sup> Maurice Obstfeld and Linda Tesar, “The decline in long-term interest rate,” whitehouse.gov, 2015.  
<https://obamawhitehouse.archives.gov/blog/2015/07/14/decline-long-term-interest-rates>



As a result, the U.S. economy suffered significantly with steep GDP declines. The GDP declined in the second quarter at an annual rate of 32.9% as restaurants and retailers closed their doors in a desperate effort to slow the spread of the virus. This decline was more than three times as sharp as the previous record — 10% in 1958 — and nearly four times the worst quarter during the Great Recession.

On March 15, 2020, and in response to the COVID-19 virus risk, the Federal Reserve Open Market Committee decided to lower the target range for the federal funds rate to 0 to  $\frac{1}{4}$ %. The Committee expects to maintain this target range until it is confident that the economy has weathered recent events and is on track to achieve its maximum employment and price stability goals.

Q. IN YOUR OPINION, ARE THESE POLICY MOVES TARGETING SHORT-TERM INTEREST RATES OR LONG-TERM INTEREST RATES?

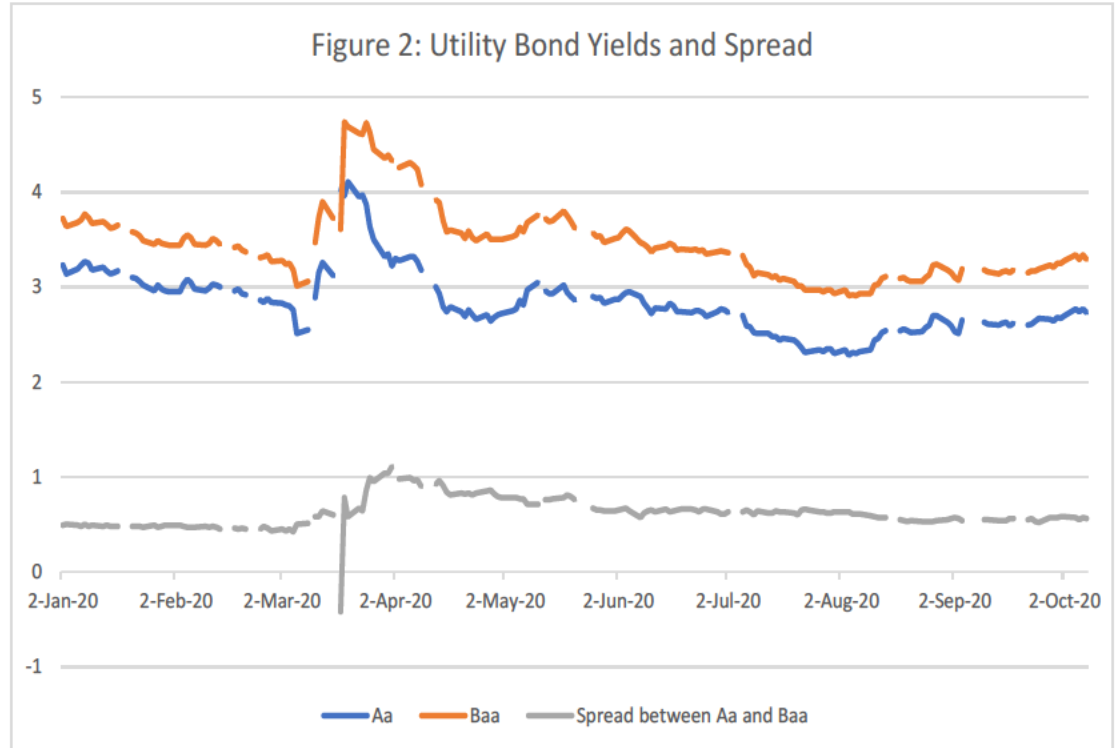
1 A. These policy moves are anti-recessionary policy of the Federal Reserve. The  
2 specific interest rate targeted is the federal funds rate, which is an over-night or  
3 extremely short-term rate. I expect it to have a minimum impact on the long-  
4 term interest rates as I have discussed above.

5 Q. HOW HAS COVID-19 IMPACTED THE CAPITAL MARKET AND THE  
6 REQUIRED RETURNS ON EQUITY OF UTILITY COMPANIES?

7 A. The utility industry and the capital market in general have been affected  
8 significantly by the COVID-19 virus. There are at least several changes that  
9 have impacted the required returns on capital.

10 The utility bond yield and spread increased noticeably at the breakout  
11 of the pandemic. The following chart shows that both the yields and the spread  
12 increased significantly in March; however, the bond market has stabilized since  
13 as both the utility bond yields and spread have declined to the pre-pandemic  
14 levels (see Figure 2 below).

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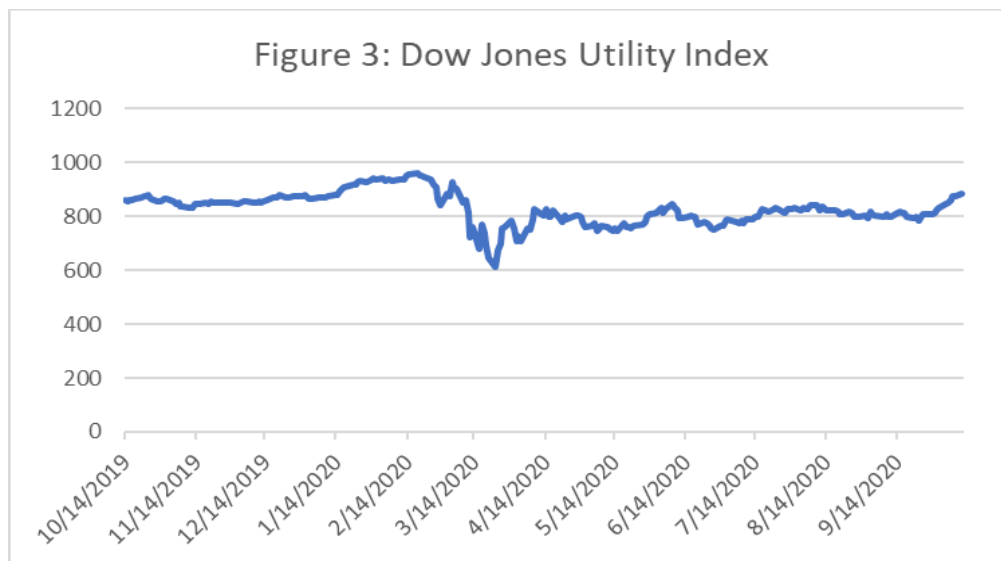
10

11

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13

In addition, utility stock prices have declined since March 2020. Figure 3 below shows the Dow Jones utility index for the last year. There was a sharp decline in utility stock prices in March, followed by volatilities in the stock prices with the index hovering around 80. This has implications concerning the dividend yield as dividend yield is a part of return on equity in the DCF model. As stock prices decline with no changes in the dividend payout, utility companies' dividend yield would increase. For example, for the period of September 2019 through February 2020, the average dividend yield for all U.S. electric utilities, as defined by *Value Line*, was 3.08%, while the dividend yield for the next six-month period of March through September 2020 was 3.76%, an increase by a magnitude of 22 percent.

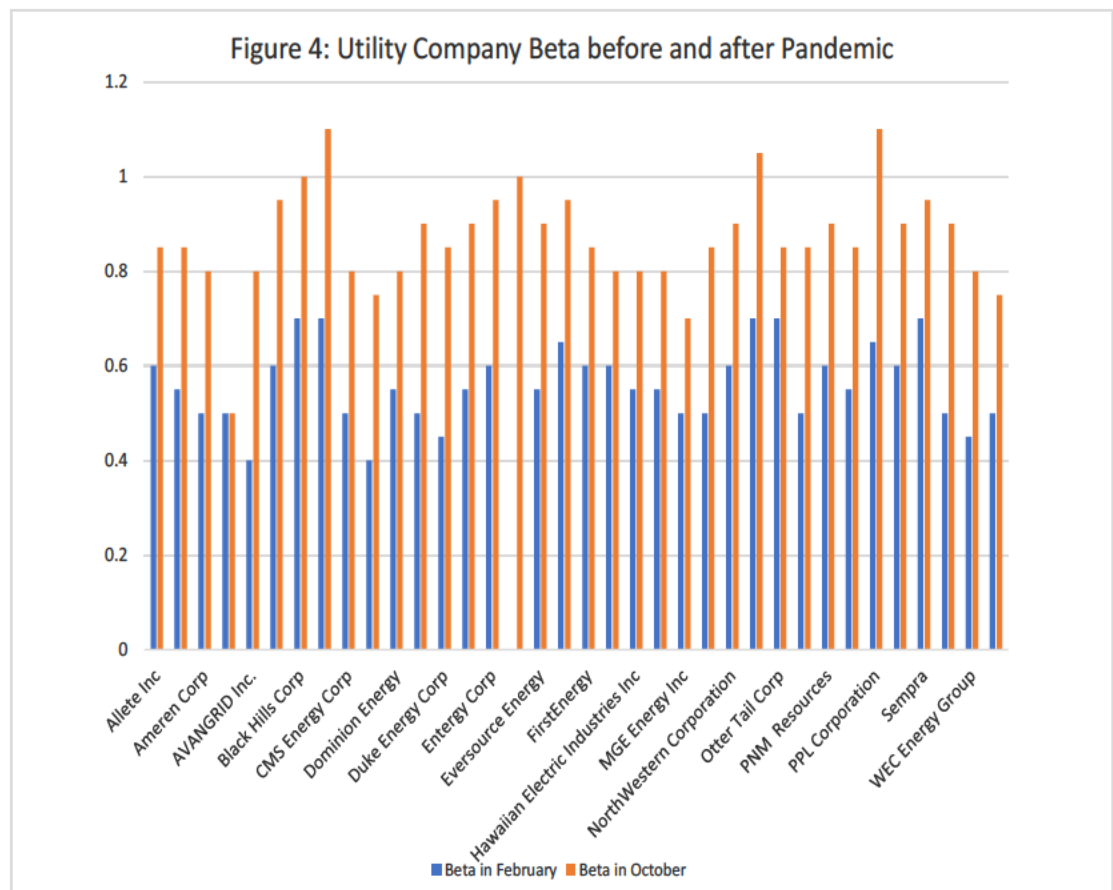


Furthermore, as the economy slows down due to the pandemic, the earnings growth prospect for utility companies has declined. For example, the average earnings growth rate of all utility companies at the end of February, as projected by Institutional Brokers Estimate System (IBES), was 5.61% while the projection at the beginning of October was 3.46%, with some companies showing significant negative projected earnings growth rate. The overall impact of the pandemic on expected returns on equity depends on the relative magnitudes of the changes in dividend yields and expected earnings growth rates.

Q. DO YOU THINK THE MARKET RISKS FACED BY THE UTILITY INDUSTRY HAVE INCREASED AS WELL?

A. One measure of the utility company stock price risk is the association of its stock price fluctuation with market price movement; this is beta. Figure 4 shows the beta value change for each electric company in *Value Line* before and during

the pandemic. The average value of beta before the pandemic was 0.56 while the value in early October was 0.86, a substantial increase in the risk of the utility stocks with respect to the market index. I believe that the increase in these beta values is likely temporary and the beta values will return to a more normal level when the pandemic is over and the economy returns to the normal condition. In this sense, the return on equity measured by the CAPM model will be higher than the ROE under normal economic and capital market conditions as the ROE generated by the CAPM model crucially depends on the beta estimates.



1                                    III. CAPITAL STRUCTURE AND COST OF DEBT

2        Q.        WHAT IS DESC'S PROPOSED CAPITAL STRUCTURE?

3        A.        The Company proposed a hypothetical capital structure of 53.35% equity and  
4                    46.65% long-term debt. This is a pro forma capital structure as of May 30, 2020.

5        Q.        DO YOU AGREE WITH THE COMPANY'S PROPOSED CAPITAL  
6                    STRUCTURE?

7        A.        No, I do not agree with the company's proposed capital structure as DESC did  
8                    not apply the test year in developing its proposed capital structure. The  
9                    Commission has previously recognized the importance of using a test year<sup>11</sup>:

10                    Another long-standing regulatory standard applied by this  
11                    Commission in setting rates is the application of a test year.  
12                    As routinely recited by this Commission: "The test year is  
13                    established to provide a basis for making the most accurate  
14                    forecast of the utility's rate base, revenues, and expenses in  
15                    the near future when the prescribed rates are in effect. The  
16                    historical test year may be used as long as adjustments are  
17                    made for any known and measurable out-of-period changes  
18                    in expenses, revenues, and investments." See Order No.  
19                    2018-445, Docket No. 2016-384-S (2018).

20                     
21                    DESC has not specified any convincing reasons for not following the test year  
22                    rule.

23                     
24        Q.        WHAT IS THE APPROPRIATE EQUITY RATIO ACCORDING TO YOUR  
25                    ANALYSIS?

26        A.        I believe the more appropriate capital structure for DESC is 52.54% equity and  
27                    47.44% debt, as it is the actual capital structure at the end of the test year. This

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<sup>11</sup> South Carolina Public Service Commission, Docket No. 2018-319-E – Order No. 2019-323 May 21, 2019 Pages 14- 15

1 structure is consistent with the Company's commitment to maintain a capital  
2 structure of 50% to 55% to support a strong investment grade credit for DESC.

3 Q. HOW DOES THAT COMPARE TO THE CAPITAL STRUCTURE OF THE  
4 COMPARABLE GROUP?

5 A. I have reviewed the capital structure of both the Zhu proxy group (see Exhibit  
6 No.\_\_(ZZ-3) and the Vander Weide proxy group. The average/median equity  
7 ratio is about 47-48% throughout most recent years. The equity ratio has been  
8 below 47% in more recent years for Dominion Energy, the parent company of  
9 DESC.

10 Q. WHAT IS THE APPROPRIATE COST OF LONG-TERM DEBT FOR  
11 DETERMINING THE COST OF CAPITAL OF DESC?

12 A. The Company has a weighted average cost of long-term debt of 6.46%. This is  
13 the embedded return on the Company's long-term debt. Any newer  
14 financing/refinancing with a lower/higher rate will result in a lower/higher  
15 weighted average cost of capital. I accept this rate as the representation of the  
16 Company's cost of debt; thus, I used this rate in my calculation of the  
17 Company's weighted cost of capital.

18

19 IV. COST OF COMMON STOCK

20 Q. WHAT MEASURES OF COST OF COMMON STOCK EQUITY HAVE  
21 YOU USED TO CALCULATE THE COMPANY'S COST OF CAPITAL?

22 A. I used three common methods of cost of equity calculations, namely, the DCF  
23 method, the CAPM and the RP model. The first two methods examine an



individual company's financial information. I also use the Risk Premium method to obtain the equity premium for the whole utility capital market. All three methods are market based and they are recognized methods used in cost of capital proceedings.

The DCF method is based on anticipation of the company's future earnings and growth opportunities, so one requirement for the selection of the company is that company needs to pay dividends to equity owners. The CAPM model is based on the risk premium concept. Both the DCF and CAPM models take into account the investors' understanding and expectation of the economic environment, at present and in the future, and the current industry and company-specific information. The Risk Premium model utilizes the negative empirical relationship between interest rate and the expected risk premium which is the difference between the expected return (one representation is the firm's authorized ROE) and interest rate.

Q. PLEASE DEFINE AND EXPLAIN THE DCF METHODOLOGY FOR MEASURING THE COST OF COMMON EQUITY.

A. The DCF method calculates the required return for an investor as follows:

$$K = \frac{D}{P} + g$$

where:  $K$  = cost of common equity  
 $D$  = expected next-period dividend per share  
 $P$  = price per share and  
 $g$  = growth rate of dividends, or alternatively, common stock earnings.

1           In the equation, “K” is the required rate of return on investment by  
2 investors. It is also the discount rate that is used to convert the future cash flows  
3 from the investment into the present value. “D” is the expected next-period  
4 amount of dividend paid to equity holders. “P” is the current market price of  
5 the common stock, representing the current valuation of the company by the  
6 market. So “D/P” is the expected next-period dividend yield on the company’s  
7 common stock. And “g” is the expected growth rate of the dividend or earnings.

8 Q.   WHAT DOES THE COST OF EQUITY CALCULATED FROM DCF  
9 REPRESENT?

10 A.   The DCF method, as cited in the most common form, generates an estimate of  
11 the return required for an investor to measure against alternative investment  
12 opportunities. This represents the minimal return in order for a company to  
13 attract and maintain investment in the company’s common equity. It represents  
14 the investor’s expectation based on available current market information.

15 Q.   WHAT FORMS OF THE DCF MODEL HAVE YOU USED IN  
16 CALCULATING THE COST OF EQUITY?

17 A.   When the DCF model is used to calculate required return on equity, the  
18 appropriate EPS growth rate must be used because the model looks at the  
19 perpetual EPS growth rate. The constant growth DCF model is a standard DCF  
20 model used in practically all cost of capital proceedings. The correct use of the  
21 growth rate is essential to the correct valuation of the required return. I used a  
22 two-step DCF model to estimate ROE which I will explain more in the next  
23 section.

1  
2 V. CONSTANT GROWTH DCF MODEL

3 Q. WHAT STOCK PRICE DID YOU USE IN YOUR CONSTANT GROWTH  
4 DCF MODEL?

5 A. I have reviewed and used the six-month average of stock prices. Stock price  
6 varies on a daily basis. The use of a six-month average reduces the impact of  
7 price volatility and reasonably represents the normal market condition  
8 concerning the value of the stock. As the market price can be volatile on a daily  
9 basis, I first calculated the average of monthly highs and lows as the monthly  
10 price. I then averaged the monthly price to obtain the average price for the six-  
11 month period. A six-month average limits the impact of abnormal stock price  
12 fluctuations. This method of calculating the average stock price is also the  
13 method adopted by FERC. The sample period I used for the stock prices runs  
14 from April 1, 2020 through September 30, 2020.

15 Q. HOW DID YOU CALCULATE DIVIDEND YIELD?

16 A. The dividend yield is calculated as the ratio of expected dividend at the end of  
17 the first period to the stock price at the beginning of the period. I collected the  
18 quarterly dividend for the same six-month period with the ending date matching  
19 the ending date of the stock price. I annualized the quarterly dividend by  
20 multiplying the quarterly dividend by 4. Then for each month, I calculated the  
21 dividend yield by dividing the annual dividend by the monthly stock price. The  
22 dividend yield for the six-month period is the average of the monthly dividend  
23 yield during the period. In the DCF model, dividend yield is the expected next-

1 period dividend. So I multiplied the dividend yield by the expected dividend  
2 growth rate.

3 Q. WHAT GROWTH RATE INFORMATION DID YOU USE IN THE  
4 CALCULATION OF THE RETURN ON EQUITY?

5 A. The stock price and dividend information is known to the investors; however,  
6 the expected dividend growth rates are not directly observable and need to be  
7 estimated. I believe investors project the dividend growth rate based on all  
8 available information; therefore, I have chosen the projected 5-year EPS growth  
9 rate by IBES. The IBES provides some of the most comprehensive financial  
10 information in business investment. IBES projected growth rates represent a  
11 consensus of multiple analysts, including some of the analysts included in First  
12 Call and Zacks. Dr. Vander Weide also used IBES projected earnings growth  
13 rate in his calculations. The IBES source of projected earnings is widely used  
14 by the market and is publicly available. The IBES growth rates obtained is  
15 reported in Exhibit No.\_\_\_\_(ZZ-4).

16 To check the ROE results using the IBES projected earnings growth  
17 rate, I also employed the earning growth rate by *Value Line* (Exhibit  
18 No.\_\_\_\_(ZZ-4)). *Value Line* represents another independent evaluation of the  
19 earnings growth forecast and is well-respected by the financial industry.

20 Q. DID YOU USE IBES PROJECTED EPS GROWTH RATE AS THE FINAL  
21 FORM OF EARNINGS GROWTH RATE?

22 A. No, I did not adopt the IBES earnings forecast as the final estimate of the  
23 earnings growth rate. As IBES earnings forecast is typically not of very long

1 term – 3 to 5 years maximum, I also used the long-term growth rate to correctly  
2 calculate the earnings growth rate in the long term. To obtain a more reliable  
3 measure of EPS growth in the long term, I have used a weighting scheme that  
4 FERC adopted, known as the Two-Step DCF method.

5 Q. WHAT IS THE TWO-STEP DCF METHOD?

6 A. In the two-step method, relatively short-term earnings growth forecasts, such as  
7 IBES projections, are obtained first. In the second step, the constant growth rate  
8 (g) is augmented by a measure of the long-term growth, and then the overall  
9 earnings growth rate is the weighted average of relatively short-term growth  
10 rate projections and the long-term growth projections.

11 Q. WHAT IS THE LONG-TERM GROWTH RATE YOU USED AND HOW  
12 DID YOU DETERMINE THE WEIGHTS?

13 A. I have used the GDP growth rate as the measure of the long-term growth rate.  
14 In perpetuity, the value of the stock market should grow at the same rate as the  
15 economy grows. The two sources of the expected growth I used are [1] Energy  
16 Information Administration, Annual Energy Outlook (AEO) 2020 and [2]  
17 Social Security Administration, 2020 OASDI Trustees Report. These two  
18 sources are frequently cited in cost of capital proceedings. For example, FERC  
19 requires the calculation of the EPS growth rate incorporating these two sources  
20 of long-term economic projections in addition to the projections by HIS Global  
21 Insight.

1           When calculating the expected future earnings growth rate, I used the  
2           weights of 0.8 and 0.2 for the IBES growth rate and the GDP growth rate  
3           respectively. The detailed calculation of the long-term growth rate is shown in  
4           Exhibit No.\_\_\_\_(ZZ-5). My assessment of the long-term economic growth,  
5           based on most recent available information from these sources, is 4.09%.

6   Q.   DID YOU ALSO OBTAIN THE DCF RESULT BASED ON THE ONE-STEP  
7           PROCEDURE?

8   A.   Yes, I also calculated the ROE based on the one-step DCF method. In this case,  
9           the growth rate is solely measured by the IBES projected earnings growth rate  
10          without being weighted by the long-term economic growth rate.

11   Q.   PLEASE SUMMARIZE YOUR ROE RESULT BASED ON THE  
12          CONSTANT GROWTH DCF MODELS?

13   A.   After adding the expected dividend yield to expected earnings growth rate for  
14          both the two-step and one-step DCF models, I averaged the ROE results from  
15          both models to arrive at my DCF ROE result. Exhibit No.\_\_\_\_(ZZ-4) illustrates  
16          the calculation of the ROEs based on the six-month average stock prices. I  
17          obtained the median and mean cost of equity of 8.57% based on the Zhu proxy  
18          group. I also calculated the ROE based on my methodology applied to the  
19          Vander Weide sample, and the result is shown in Table 3 below. The Vander  
20          Weide proxy group has generated essentially the same ROE numbers. This is  
21          expected as our two proxy groups are sufficiently close to each other.

| Table 3: DCF ROE results |              |              |         |                     |              |         |
|--------------------------|--------------|--------------|---------|---------------------|--------------|---------|
|                          | Zhu Sample   |              |         | Vander Weide Sample |              |         |
|                          | Two-<br>Step | One-<br>Step | Average | Two-<br>Step        | One-<br>Step | Average |
| Lower End                | 5.81%        | 5.29%        | 5.55%   | 5.81%               | 5.29%        | 5.55%   |
| Upper End                | 11.97%       | 12.95%       | 12.46%  | 11.97%              | 12.95%       | 12.46%  |
| Median                   | 8.40%        | 8.74%        | 8.57%   | 8.36%               | 8.62%        | 8.49%   |
| Average                  | 8.49%        | 8.65%        | 8.57%   | 8.48%               | 8.64%        | 8.56%   |
| Midpoint                 | 8.89%        | 9.12%        | 9.01%   | 8.89%               | 9.12%        | 9.01%   |

## VI. THE CAPM METHOD

Q. PLEASE DESCRIBE THE CAPM METHOD IN THE CALCULATION OF THE COST OF COMMON EQUITY.

A. The CAPM method is based on the analysis of risks. There are two types of risks to consider; one is the kind of risk that investors can diversify away or reduce by combining different investments into a portfolio; the other is the market risk an investor cannot reduce by diversification. Therefore, the CAPM method is a risk premium model based on the calculation of the risk differential between investments on the market portfolio and the individual stock. The calculation of the required rate of return on the company's stock is as follows:

$$K = R_F + \beta (R_M - R_F)$$

Where: K = the required return.  
 $R_F$  = the risk-free rate.  
 $R_M$  = the required overall market return; and  
 $\beta$  = beta, a measure of a given security's risk relative to that of the overall market.

The idea of calculating the required return on the individual investment from CAPM is to find the equivalent return for an investor based on the relative risk of the investment as compared to the alternative investment opportunities.

1 Here, the alternative investment opportunity is usually assumed as the market  
2 portfolio. This is a model that suggests investors should be compensated for  
3 bearing risks. Typically, the risk-free rate is a benchmark investment on which  
4 investors can be compensated for not bearing any risks. The benchmark risk-  
5 free rates are typically Treasury security yields. The market return is the return  
6 on all other available investment alternatives to the investor. This is typically a  
7 rate generated from a relevant market index. The risk of the firm's common  
8 stock is reflected in the beta of the company, which measures the relative stock  
9 price volatility of the company compared to the overall market. Therefore, the  
10 CAPM model has two general components: one is the risk-free rate, and the  
11 other is the company risk premium, which is the product of the company's beta  
12 and market risk premium ( $\beta \times \text{MRP}$ ). The market risk premium (MRP) is the  
13 difference between the expected market return and the risk-free rate ( $R_M - R_F$ ).

14 Q. PLEASE EXPLAIN YOUR CAPM CALCULATIONS.

15 A. I used the 30-year Treasury bond yield as the benchmark risk-free rate. I  
16 obtained the betas for the comparable companies from *Value Line*. Finally, I  
17 developed a measure of market risk premium based on the DCF model applied  
18 to S&P 500 dividend paying companies.

19 Q. PLEASE DESCRIBE THE RISK-FREE RATE.

20 A. I used the six-month average yield on 30-year Treasury bonds. As utility  
21 investments are usually long term, a longer-term Treasury bond would reflect  
22 the market condition better for the investments. The yield reflects all market  
23 information known to investors at the time including the possibility of future



1 interest rate increase. Thus, the 30-year Treasury bond yield is a best measure  
2 of the required return on risk-free instrument.

3 Q. PLEASE EXPLAIN THE BETA OF THE COMPARABLE COMPANIES.

4 A. Betas measures the connection between the company's stock volatilities and the  
5 overall market volatilities. Many professional financial services, including  
6 *Value Line*, provide the estimate of the company beta. As it is generally known  
7 that a raw beta obtained from the regression of the company stock returns on  
8 market returns tends to move toward 1, *Value Line* has adjusted its estimated  
9 betas accordingly. I believe the *Value Line* beta values are appropriately  
10 estimated to measure the company's stock price variations compared to the  
11 overall market index. Therefore, the product of the company's beta and market  
12 risk premium produces the company's risk premium.

13 Q. PLEASE DESCRIBE YOUR ANALYSIS OF MARKET RISK PREMIUM.

14 A. As the CAPM model estimates the expected return on equity, the market risk  
15 premium should be the expected equity market return over the risk-free rate.  
16 The estimate of the market equity risk premium is perhaps the most contentious  
17 issue for the financial market; however, there are generally accepted ways to  
18 estimate the equity risk premium. One method is to obtain the expected market  
19 return via DCF method. Many jurisdictional authorities, including FERC,  
20 accept the market return calculated using a DCF method.

21 Q. PLEASE EXPLAIN WHAT MARKET INDEX YOU HAVE USED.

22 A. I have used the S&P 500 index to represent the overall equity market. After  
23 obtaining the name of the companies included in the market index, I have

1 excluded the companies that do not pay dividends and the companies that have  
2 negative projected earnings growth rates and growth rates higher than 20%. If  
3 a company has a negative earnings growth rate, it will not be sustainable in the  
4 long run. Similarly, it is not possible for a company to have an earnings growth  
5 rate of 20% forever; therefore, I have eliminated those companies from the list.  
6 The final sample included more than 300 companies, which is large enough to  
7 represent the broad spectrum of the businesses in the U.S. economy.

8 Q. WHY DID YOU EXCLUDE NON-DIVIDEND PAYING COMPANIES  
9 FROM THE CALCULATIONS?

10 A. I have excluded companies in the S&P 500 index that do not pay dividend or  
11 have negative dividend growth rates. This is the same approach that Dr. Vander  
12 Weide took in applying the DCF model to the companies in the index. The  
13 expected market return is the weighted average of individual company returns  
14 (ROE derived from the DCF model) with the market capitalization being the  
15 weight. The DCF model is based on the premise that a company's value is based  
16 on future dividends to the investors. The model breaks down if no dividend is  
17 issued to the investors. In other words, the DCF model cannot be applied to  
18 companies that do not issue dividends.

19 Q. DID YOU USE A ONE-STEP DCF MODEL OR A TWO-STEP DCF MODEL  
20 TO OBTAIN THE INDIVIDUAL COMPANY'S ROE?

21 A. I used a one-step DCF model to calculate the ROE of an individual company.  
22 When I applied the one-step DCF method to the data, I directly used the IBES  
23 projected earnings growth rate.

1 Q. WHAT IS YOUR ESTIMATED MARKET RISK PREMIUM?

2 A. My estimated market return is 10.92% and market risk premium is 9.54% by  
3 the one-step DCF method. These results are presented in Exhibit No. \_\_\_\_ (ZZ-  
4 6).

5 Q. WHAT IS YOUR ESTIMATED ROE BASED ON THE CAPM MODEL?

6 A. I used the following method to obtain the estimates of the ROE: I applied the  
7 market risk premium obtained from the one-step DCF model to each  
8 comparable company's beta to obtain beta-adjusted company risk premium and  
9 then added to the risk-free rate. Then I calculated the average and median of the  
10 individual company's ROE based on the CAPM model. The final result of ROE  
11 in Exhibit No. \_\_\_\_ (ZZ-7) shows the application and the results of the method.  
12 Table 4 below shows the summary of the CAPM model result. To have a  
13 comparison, I have also included the CAPM result from the Vander Weide  
14 proxy group companies applying my CAPM method.

15

| Table 4: CAPM ROE Results |            |                     |
|---------------------------|------------|---------------------|
|                           | Zhu Sample | Vander Weide Sample |
| Lower End                 | 6.14%      | 6.14%               |
| Upper End                 | 11.87%     | 11.87%              |
| Median                    | 9.48%      | 9.48%               |
| Average                   | 9.72%      | 9.59%               |
| Midpoint                  | 9.01%      | 9.01%               |

16

17 The median from both sample groups is 9.48% and the ROE value  
18 ranges from a low of 6.14% to a high of 11.87% with a mean value of 9.72%.  
19 The increase in the beta values of proxy companies during the pandemic has led  
20 to significant increases in the ROE values by the CAPM method. These values

1 signify the increase in the risks of the utility companies in the current market  
2 conditions.

3  
4 VII. THE RISK PREMIUM MODEL

5 Q. HAVE YOU USED ANY OTHER METHOD TO ESTIMATE THE ROE?

6 A. Yes. The other method that I used is the risk premium, or bond return plus  
7 equity risk premium model, which is another risk-based model.

8 Q. PLEASE DESCRIBE THE PRINCIPLE IDEA BEHIND THE RISK  
9 PREMIUM MODEL.

10 A. The RP model is based on the idea that equity owners or stockholders require  
11 higher returns than the bond holders who simply hold less risky bonds.  
12 Therefore, this risk-reward relationship reflects the basic principle in financial  
13 economics. The return on equity is then equal to bond yield plus a form of risk  
14 premium which is the difference between expected returns of the stocks and  
15 bond yield.

16 Q. HOW CAN THIS MODEL BE ESTIMATED TO GENERATE EXPECTED  
17 RETURNS ON EQUITY?

18 A. There are many versions of the risk premium models, depending on the stock  
19 returns and interest rates used. One typical form of the risk premium is  
20 measured by the difference between a utility's authorized ROE and a particular  
21 kind of long-term interest rate, frequently being the 30-year bond yield. The  
22 relationship between equity risk premium and bond yield is empirically  
23 obtained through regression of risk premium on bond yield. Then the estimated

1 regression equation coefficients are used to obtain the expected ROE given the  
2 bond yield.

3 Q. PLEASE EXPLAIN HOW YOU OBTAINED THE RISK PREMIUM DATA  
4 AND HOW YOU EMPIRICALLY ESTIMATED THE RELATIONSHIP  
5 BETWEEN RISK PREMIUM AND INTEREST RATE?

6 A. I used the authorized ROEs from past electric utility rate cases since 1980 to  
7 represent the expected returns and then subtracted the long-term interest rate,  
8 in this case, the 30-year Treasury bond yield, to generate the risk premium. I  
9 have included only past rate cases of fully integrated electric utilities in my  
10 sample. I have included fully litigated cases as well as settled cases. The  
11 exclusion of the settled cases does not make any material difference as the  
12 obtained ROEs are essentially the same using either the fully litigated sample  
13 or litigated plus settled sample.

14 Then I regressed the risk premium on interest rate to obtain the  
15 relationship between the risk premium and the interest rate. In order to capture  
16 the interest rate for the rate case as closely as possible, I have averaged the 30-  
17 year Treasury-bond yield for the period of the rate case, i.e., from the filing date  
18 to the decision date. This estimated relationship has been utilized to estimate  
19 the risk premium given the current interest rate. I have calculated the average  
20 length of a typical rate case and my result revealed that the average period is  
21 about 9 months. I then used the average Treasury-bond yield during the last 9  
22 months (up to September 30, 2020) as the interest rate. The estimated risk  
23 premium then is added to the interest rate to yield the expected return on equity.

1 Q. USING THE CURRENT 30-YEAR BOND YIELD, WHAT IS YOUR  
2 ESTIMATE OF ROE PER THE RISK PREMIUM METHOD?

3 A. My estimated risk premium is 7.29%. See Exhibit No.\_\_\_\_(ZZ-8). With the 30-  
4 year Treasury-bond yield at 1.44%, my estimate of the ROE using the risk  
5 premium method is 8.73%. Dr. Vander Weide used several measures of risk  
6 premium models including an *ex ante* model and two versions of the *ex post*  
7 models with returns measured by S&P 500 index returns. His *ex ante* model  
8 generated a 10.1% return and *ex post* models generated expected returns of  
9 8.4% to 9.1%. However, Dr. Vander Weide used projected interest rates instead  
10 of current interest rates when he developed the expected ROE. This use of  
11 projected interest rate is not appropriate.

12 Q. WHAT IS YOUR RECOMMENDATION OF COST OF CAPITAL?

13 A. My overall calculation of the ROE is shown in Table 5 below:

| Table 5: Summary of Expected ROE Analysis |        |        |         |        |              |
|---|--------|--------|---------|--------|--------------|
|   | DCF    |        |         | CAPM   | Risk Premium |
|   | V1     | V2     | Average |        |              |
| Lower End                                 | 5.81%  | 5.29%  | 5.55%   | 6.14%  |              |
| Upper End                                 | 11.97% | 12.95% | 12.46%  | 11.87% |              |
| Median                                    | 8.40%  | 8.74%  | 8.57%   | 9.48%  |              |
| Average                                   | 8.49%  | 8.65%  | 8.57%   | 9.72%  | 8.73%        |
| Midpoint                                  | 8.89%  | 9.12%  | 9.01%   | 9.01%  |              |
| Midpoint of Absolute High and Low         |        |        |         | 9.38%  |              |
| Midpoint of three models (DCF, CAPM, RP)  |        |        |         | 9.14%  |              |
| Average of three models (DCF, CAPM, RP)   |        |        |         | 9.00%  |              |

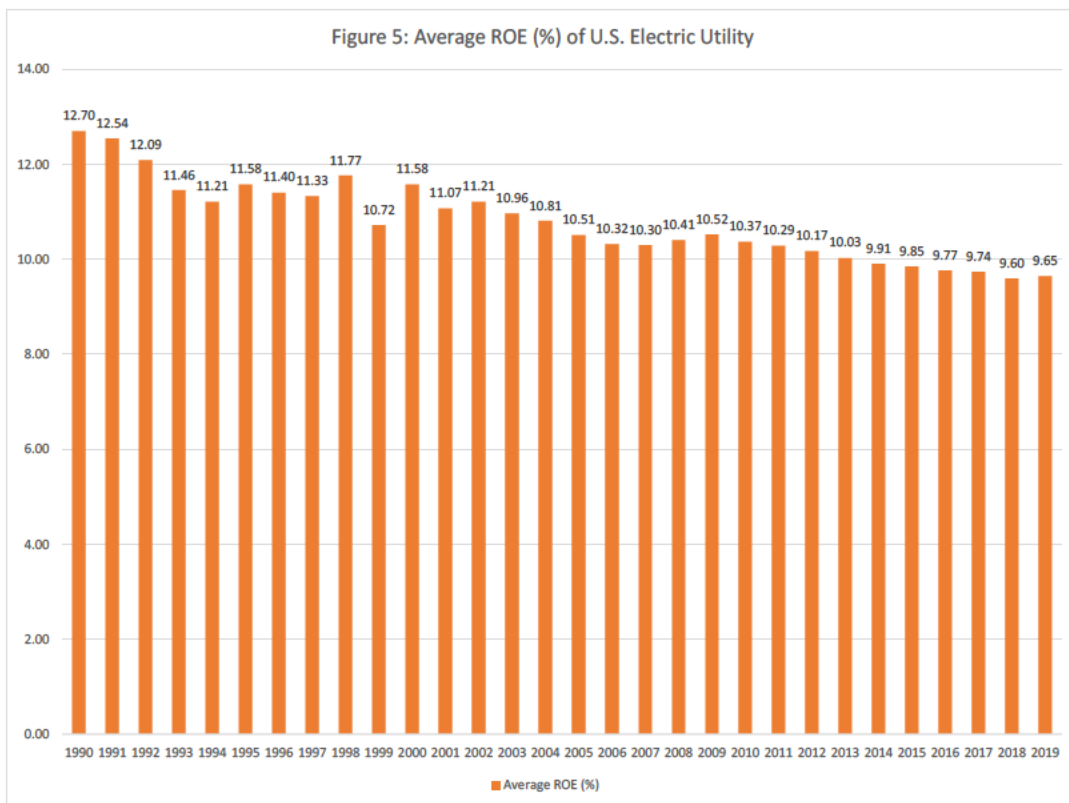
14  
15 The median ROE ranges from 8.57% to 9.48%, the average ROE of three  
16 models is 9.00%, and the midpoint of three models (DCF, CAPM and RP) is

1 9.14%. These values are substantially lower than Company witness Dr.  
2 Vander Weide's recommended value of 10.4%. Considering the fact that  
3 capital market conditions have changed in more recent years and the fact that  
4 DESC is a company that faces similar risks to its peer group companies, there  
5 is a strong reason to believe that the just and reasonable ROE is below 10.4%  
6 and within the range of what I have calculated. Based on my calculations, I  
7 recommend a ROE number of 9.1%.

8 Based on the recommended ROE of 9.1%, the embedded cost of debt  
9 of 6.46%, and a capital structure of 52.86% debt and 47.44% equity, my  
10 recommended cost of capital is 7.85%.

11 Q. HOW REASONABLE IS YOUR 9.1% ROE RECOMMENDATION GIVEN  
12 THE RECENT ROE REGULATORY ENVIRONMENT?

13 A. It is well recognized that the cost of capital has declined over recent years.  
14 Figure 5 below plots the average authorized ROE of U.S. regulated utilities. It  
15 is very obvious that the authorized ROE has been declining over time,  
16 consistent with the perception that the risks faced by the U.S. utility industry  
17 have been declining.



In 2019, in the neighboring state of Virginia, the Virginia State Corporation Commission authorized a ROE of 9.2%; and in South Carolina, Duke Energy Carolinas and Duke Energy Progress had an authorized ROE of 9.5%.<sup>12</sup>

In a news release, Virginia State Corporation Commission stated:<sup>13</sup>

In rejecting Dominion’s requested return on equity (ROE) of 10.75%, the Commission said that the proposed profit “represents neither the actual cost of equity in the marketplace nor a reasonable ROE for [Dominion]. Nor is Dominion’s proposed ROE of 10.75% consistent with the public interest.”

<sup>12</sup> Virginia State Corporation Commission, Case No. PUR-2019-00050, Final Order (Nov 21, 2019). . South Carolina Public Service Commission, Docket Number 2018-318-E – Order No. 2019-341, May 21, 2019.

South Carolina Public Service Commission, Docket Number 2018-319-E – Order No. 2019-323, May 21, 2019.

<sup>13</sup> <https://scc.virginia.gov/newsreleases/release/SCC-Rejects-Dominion%E2%80%99s-Proposed-Rate-of-Profit;-Cu>



1 In contrast, the Commission found that a return of 9.2% was  
2 “consistent with the public interest” and “reasonably  
3 balances the interests of [Dominion], its customers, and its  
4 investors.”  
5

6 Q. DESC IS REQUESTING THE SAME ROE OF 10.25% IN THIS CASE  
7 THAT WAS AUTHORIZED IN THE 2012 RATE CASE. DO YOU AGREE  
8 THAT DESC SHOULD MAINTAIN ITS PREVIOUSLY AWARDED ROE  
9 FOR THIS CASE?

10 A. No. *Bluefield* holds that:<sup>14</sup> “A rate of return may be reasonable at one time and  
11 becomes too high or too low by changes affecting the opportunities for  
12 investment, the money market, and business conditions generally.”

13 In addition, the South Carolina Public Service Commission has  
14 recognized that “the rate of return should be determined with due regard for  
15 the present business and capital market conditions facing the utility.”<sup>15</sup>

16 The Commission authorized 10.25% in 2012 given the market  
17 conditions at that time. The economic and capital market conditions have  
18 changed significantly in the last eight years and to reflect such changes, the  
19 market required returns have declined significantly as well.

20 When 10.25% ROE was authorized in 2012, the national average  
21 authorized ROE for electric utilities was 10.17%. The national average for 2019  
22 was 9.65%. The request of the 10.25% ROE in this case is clearly not just and  
23 reasonable given the current market conditions. As the Commission

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<sup>14</sup> *Bluefield Water Works and Improvement Co. v. Public Service Commission of West Virginia*, 262, U.S. at 693.

<sup>15</sup> SC PSC, Order No. 2005-2, Docket No. 2004-178-E, Application of South Carolina Electric & Gas Company for Adjustments in the Company's Electric Rate Schedules and Tariffs, p. 85.

1 acknowledged in Order No. 2019-341, “while a public utility is entitled to earn  
2 a fair return, it has no entitlement or constitutional right to earn profits  
3 comparable with highly profitable enterprises or speculative ventures.”<sup>16</sup> Under  
4 the current market conditions and declining national ROE trend, 10.25% ROE  
5 is not a fair return. It is simply too high.

6  
7 VIII. CRITIQUE OF DR. VANDER WEIDE’S TESTIMONY

8 Q. WHAT IS YOUR OVERALL ASSESSMENT OF DR. VANDER WEIDE’S  
9 ROE ESTIMATIONS?

10 A. I believe Dr. Vander Weide has made many unrealistic assumptions and  
11 adjustments which have led to his calculated ROE being too high.

12 Q. WHAT INTEREST RATE SHOULD BE USED IN THE REQUIRED  
13 RETURN ON EQUITY ANALYSIS?

14 A. Investors look at the long-term performance of the investment and the relevant  
15 interest rate should be the long-term interest rate. At the time of the investment,  
16 there is uncertainty about the economic variables including the future interest  
17 rate; therefore, consumers have to utilize the best estimate they have, again  
18 including the interest rate. However, the long-term interest rate is available at  
19 the time of making the investment, these include 30-year Treasury bond yield,  
20 and long-term corporate bond yield.

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<sup>16</sup> SCPSC, Docket No. 2018-318-E -- Order No. 2019-341, In. Re: Application of Duke Energy Progress, LLC for adjustments in electric rate schedules and tariffs, May 21, 2019 page 70.

1 Q. WHAT INTEREST RATE DID DR. VANDER WEIDE USE IN HIS  
2 MODELS?

3 A. While Dr. Vander Weide used long-term interest rates, he used forecasted  
4 interest rates in his models. Specifically, he used forecasted A-rated utility  
5 bonds in his risk premium models and used forecasted 20-year Treasury bond  
6 yield for his CAPM models.

7 To estimate the ROE by risk premium model, one typically estimates  
8 the risk premium using various portfolio or market return indices and then  
9 subtracts the bond yield from the index return. In both the *ex ante* and *ex post*  
10 models of Dr. Vander Weide, he subtracted A-rated utility bond yield from the  
11 market returns. His forecast of A-rate utility bond yield was the average of the  
12 initial interest rate forecast by *Value Line* and the forecast by EIA. *Value Line*  
13 has a forecasted value of 3.3% for AAA-rated corporate bond. Utilizing the  
14 spread of 0.65% between A-rated utility bond and AAA-rated corporate bond,  
15 Dr. Vander Weide arrived at the *Value Line*-based forecast of A-rated utility  
16 bond yield of 3.95%.

17 Dr. Vander Weide also utilized the EIA forecast of AA-rated utility  
18 bond yield of 4.66%. Combining with the forecasted spread of 0.25% between  
19 AA-rated utility bond and A-rated utility bond, he came up with an EIA forecast  
20 of A-rate utility bond yield of 4.91%. Averaging 3.95% and 4.91% yielded a  
21 forecasted interest rate value of 4.43%.

22 Q. HOW DID DR. VANDER WEIDE ARRIVE AT HIS FORECASTED  
23 INTEREST RATE FOR THE CAPM MODEL?

1 A. Dr. Vander Weide used a *Value Line* forecast of 10-year Treasury bond yield  
2 of 1.5%. Combining with the spread of 0.45% between the 10-year and 20-year  
3 bonds, he realized a forecast of 1.95% for the 20-year Treasury bond yield based  
4 on the *Value Line* forecast.

5 He did the same for the interest rate forecast based on the EIA forecast  
6 of 10-year Treasury bond yield of 3.28%. Combining with the spread of 0.45%,  
7 he generated an interest rate forecast of 3.73% based on the EIA forecast.

8 Averaging the 1.95% based on the *Value Line* forecast and the 3.73%  
9 forecast based on the EIA forecast generated the forecasted value of 2.84% for  
10 the 20-year Treasury bond yield that Dr. Vander Weide used in his CAPM  
11 models.

12 Q. WHAT IS YOUR OPINION REGARDING THESE INTEREST RATE  
13 FORECASTS?

14 A. I believe interest rates are extremely difficult to forecast and the interest rate  
15 forecasts from the past have been shown to perform poorly. The alternative to  
16 the interest rate forecast is to use the current market interest rate as what the  
17 market expects about the future interest rate.

18 There is serious doubt that these interest rate forecasts can outperform a  
19 simple forecast of interest rates by using the current market interest rate. The  
20 bond markets are efficient, as the result, the best expected future interest rate is  
21 the current market interest rate.

22 Q. PLEASE EXPLAIN WHY CURRENT INTEREST RATES ARE THE BEST  
23 FORECAST OF EXPECTED INTEREST RATE?

1 A. Financial information comes into the marketplace randomly and interest rate  
2 goes up or down with equal chances. Nobody can systematically get ahead by  
3 guessing what is going to happen in the marketplace. This leads to a  
4 phenomenon called “random walk.” When a financial variable such as the  
5 interest rate follows a random walk, it implies that the best forecast of its future  
6 behavior is its immediate past. In this case, the immediately past available  
7 information is the latest interest rate or the current interest rate observable in  
8 the market. Nobody can correctly predict what is going to happen in the future  
9 systematically.

10 Q. WHAT SUPPORT DO YOU HAVE FOR THAT THE BEST FORECAST OF  
11 INTEREST RATE IS THE CURRENT INTEREST RATE?

12 A. There have been doubts about the predictability of long-term interest rates for  
13 a long time. As early as 1979, Professor Pesando provided reasons why it is not  
14 surprising for economic models to underperform the random walk forecast of  
15 interest rate.<sup>17</sup> The random walk forecast of interest rate is the current market  
16 interest rate.

17 In a more recent study, Baghestani, Arzaghi, and Kaya (2015)  
18 documented evidence of model blue chip predictions being inferior to random  
19 walk models.<sup>18</sup> In a more extensive study of U.S. interest rate forecasts,  
20 Spiwoks, Bedke and Hein, after a study of 136 forecasting series with 13,800

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<sup>17</sup> James. E. .Pesando, “On the random walk characteristics of short- and long-term interest rates in an efficient market,” *Journal of Money, Credit and Banking*, 1979, vol. 11, 457–66.

<sup>18</sup> Hamid Baghestani, Mohammad Arzaghi and Ilker Kaya, “On the accuracy of Blue Chip forecasts of interest rates and country risk premiums,” *Applied Economics*, 2015, Vol. 47, No. 2, 113–122, <http://dx.doi.org/10.1080/00036846.2014.959656>

1 forecast data, showed empirical evidence that the random walk model  
2 dominated the forecasts series.<sup>19</sup> In the article, they stated: "Not one of the  
3 forecast time series proved to be unbiased. In the majority of cases, information  
4 from the past was not efficiently integrated into the forecasts. The sign accuracy  
5 is significantly better than random walk forecasts in only a very few of the  
6 forecast time series." What this passage suggests is that the professional  
7 forecast of interest rates systematically over- or under-projected the movement  
8 of the interest rate ("not unbiased"). The majority of the forecasts could not  
9 even predict the direction of movement correctly, not to mention the magnitude  
10 of the interest rate movement.

11 Q. HOW HAS THE PAST FORECAST OF INTEREST RATE FARED?

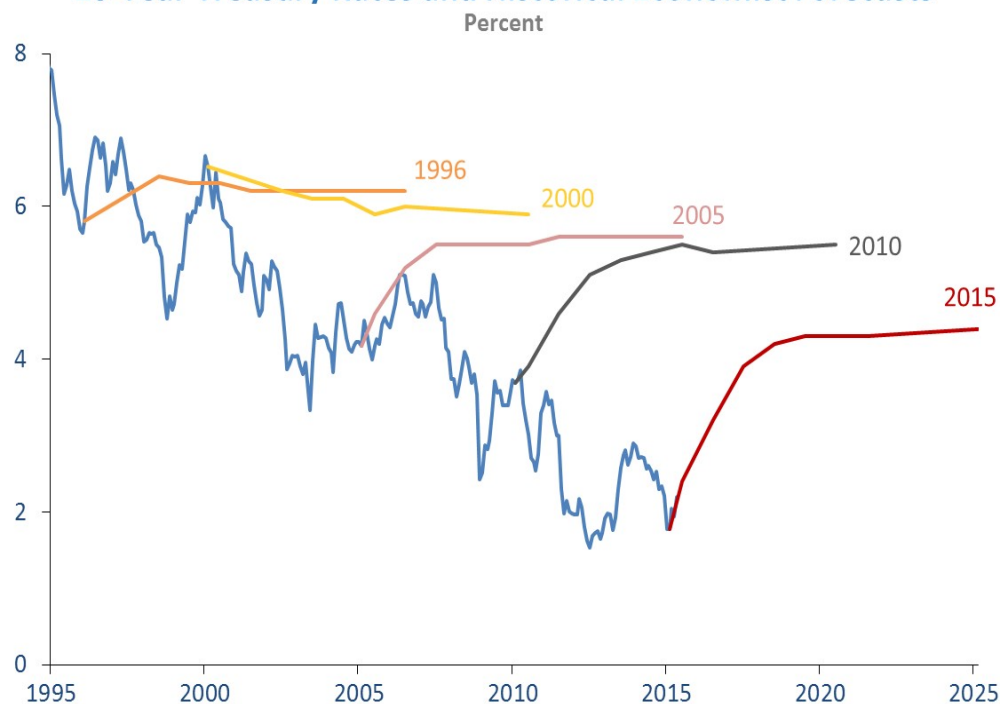
12 A. The long-term interest rate has been declining, so many would project that the  
13 interest rate will eventually rise again. However, this kind of projection has not  
14 been doing well. In 2015, Obstfeld and Tesar<sup>20</sup> presented the chart below of  
15 10-year Treasury rates and historical forecasts which showed consistently high  
16 interest rate forecasts despite the fact that the interest rate was declining over  
17 time.

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<sup>19</sup> Spiwoks, Markus; Bedke, Nils; Hein, Oliver, "Forecasting the Past: The Case of US Interest Rate Forecasts," Financial Markets and Portfolio Management Vol. 22, Iss. 4, (December 2008): 357-379.

<sup>20</sup> M. Obstfeld and L. Tesar, (2015). "The Decline in Long-Term Interest Rates".

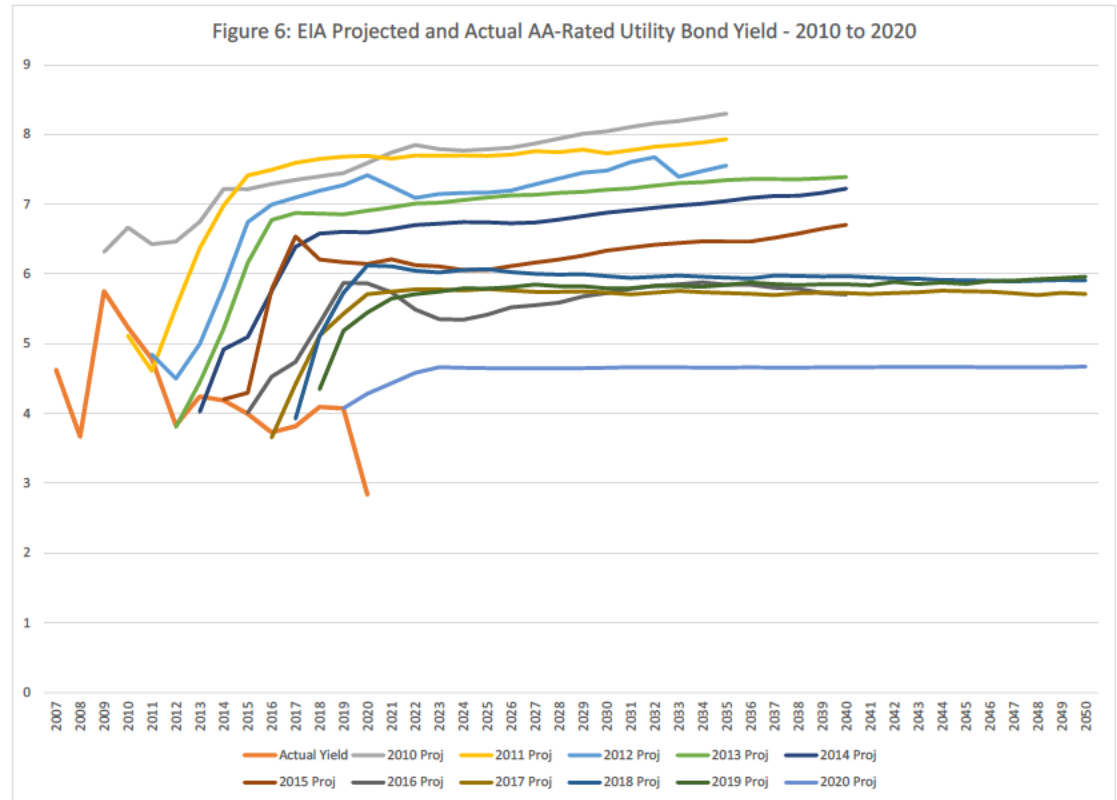
## 10-Year Treasury Rates and Historical Economist Forecasts



1  
2 This consistent over-forecast of the long-term interest rate is very  
3 similar to the EIA forecast that Dr. Vander Weide has cited and relied on  
4 heavily in forming his expected long-term interest rate. These forecasts are  
5 consistently and stubbornly on the high side, and the current EIA forecast  
6 followed EIA's past practice and will most likely lead to a too-high forecast as  
7 well. The interest rate forecasts, including the EIA forecast, cannot be relied  
8 upon. The ROE models utilizing these interest rate forecasts are expected to  
9 lead to too-high estimated market required returns.

10 Q. WHAT IS THE HISTORICAL PERFORMANCE OF THE EIA INTEREST  
11 RATE FORECAST?

1 A. The previous forecasts from EIA's Annual Energy Outlook is plotted in the  
 2 charts below. Figure 6 plots the forecasts of AA-rated utility bond yield from  
 3 EIA.



6 As can be seen from Figure 6, each time EIA forecasted the interest rate to  
 7 increase, the actual interest rate would decline further. EIA continued its  
 8 upward interest rate forecast, even when the interest rate was clearly moving  
 9 downward. Even though EIA has been adjusting the magnitude of the long-  
 10 horizon interest rate downward, its forecast of the interest rate movement across  
 11 forecast years is consistent: each forecast would project the interest rate to move  
 12 upward and then stay flat. In the latest forecast (2020 Annual Energy Outlook),

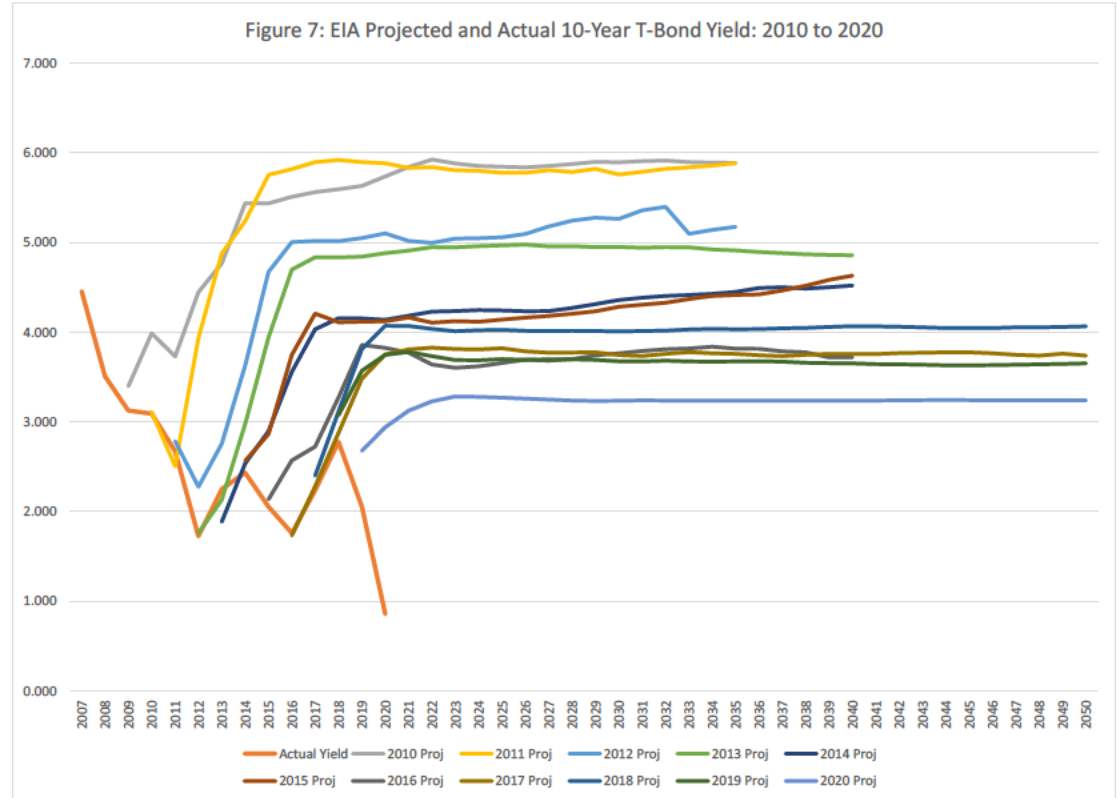


1 EIA continued to forecast interest rates to rise, but interest rates declined  
2 sharply.

3 The same forecast history can be seen in the EIA forecast of 10-year  
4 Treasury bond yield in Figure 7. Again, the very important aspect of the 2020  
5 forecast of interest rates that Dr. Vander Weide has relied on is that this year's  
6 interest rate forecast follows exactly the same pattern as in the past.

7 No matter what the reasons of this over-forecast may be, it is clear that  
8 the EIA forecast of the interest rate has not been credible in the past. In addition,  
9 in the face of persistent errors, the EIA has continued essentially the same  
10 forecasts of the long-term interest rate. Despite ample evidence that the EIA  
11 forecast cannot be trusted, Dr. Vander Weide still used the EIA forecast in  
12 projecting the required return on equity because those interest rate forecasts  
13 would generate a higher ROE for the Company, not because it will generate the  
14 fair and just ROE.

1



2

3 Q. WHAT IS THE RESULT OF CORRECTING THE INTEREST RATE  
4 FORECAST BIAS?

5 A. Correcting the problem of high interest rate forecasts and replacing it with the  
6 actual interest rate alters Dr. Vander Weide's estimation of ROE quite  
7 significantly. As Table 6 below illustrates, if we adopt Dr. Vander Weide's risk  
8 premium numbers generated from his *ex ante* and two versions of *ex post*  
9 methods, we arrive at much lower estimates of the ROE. The top panel added  
10 the 2020 up-to-date average A-rated utility bond yield to the risk premia  
11 generated by the three methods of Dr. Vander Weide. This yielded an average  
12 ROE of 7.84%. If we adopt Dr. Vander Weide's methods to arrive at his risk

1        premia but simply discard the use of EIA forecasts (still retain the *Value Line*  
2        forecast) of interest rate of 3.95%, the average ROE from the three models  
3        would be 8.73%, a number that is identical to the ROE value I generated from  
4        using a totally different approach.

| Table 6: Risk Premium Model ROE by Adjusting Interest Rate |                           |   |  |   |       |
|--|---------------------------|---|--|---|-------|
| [1]. From Exhibit __ (ZZ-8)                                |                           |   |  |   | 8.73% |
| Vander Weide   | Vander Weide risk premium | Current (2020) A-rated utility bond yield                                       | ROE based on current A-rated utility bond yield                            | ROE based on current Baa-rated utility bond yield |       |
| [2]. Ex Ante   | 5.64%                     | 3.06%   | 8.70%  | 8.70%   |       |
| [3]. Ex Post V1  | 4.70%                     | 3.06%   | 7.76%  | 7.76%   |       |
| [4]. Ex Post V2  | 4.00%                     | 3.06%   | 7.06%  | 7.06%   | 7.84% |
| Vander Weide   | Vander Weide risk premium | Vander Weide Value Line projected A-rated utility bonnd yield (No EIA forecast) | ROE based on Vander Weide Value Line projected A-rated utility bonnd yield | ROE based on current Baa-rated utility bond yield |       |
| [2]. Ex Ante   | 5.64%                     | 3.95%   | 9.59%  | 9.59%   |       |
| [3]. Ex Post V1  | 4.70%                     | 3.95%   | 8.65%  | 8.65%   |       |
| [4]. Ex Post V2  | 4.00%                     | 3.95%   | 7.95%  | 7.95%   | 8.73% |

6  
7  
8        In addition, similar to the result of Risk Premium models, if we adopt  
9        Dr. Vander Weide's market risk premium methods but replace the improper  
10       interest rate forecast with actual interest rate, we end up with much lower  
11       estimates of ROE from the CAPM models as well. Table 7 demonstrates the  
12       result of this approach, which results in ROEs below 9%.

| Table 7: CAPM Model       |              |                            |      |       |         |
|---------------------------|--------------|----------------------------|------|-------|---------|
| Current (2020) 20-year T- |              |                            |      |       |         |
| Vander Weide              | Risk Premium | bond yield                 | Beta | ROE   | Average |
| Forward Looking           | 8.70%        | 1.34%                      | 0.87 | 8.91% |         |
| Historical V1             | 7.20%        | 1.34%                      | 0.87 | 7.60% |         |
| Historical V2             | 7.20%        | 1.34%                      | 0.89 | 7.75% | 8.09%   |
| Vander Weide Value Line   |              |                            |      |       |         |
| Projected 20-year bond    |              |                            |      |       |         |
| Vander Weide              | Risk Premium | yield (Excl. EIA forecast) | Beta | ROE   |         |
| Ex Ante                   | 8.70%        | 1.95%                      | 0.87 | 9.52% |         |
| Ex Post v1                | 7.20%        | 1.95%                      | 0.87 | 8.21% |         |
| Ex Post v2                | 7.20%        | 1.95%                      | 0.89 | 8.36% | 8.70%   |

1

2 Q. WHAT IS THE OVERALL CONCLUSION OF YOUR ANALYSIS OF DR.  
3 VANDER WEIDE'S INAPPROPRIATE USE OF FORECASTED  
4 INTEREST RATE?

5 A. I conclude: 1. The best use of interest rate in the ROE analysis is the current  
6 interest rate, not the forecasted interest rate; 2. Past forecasts of interest rates  
7 grossly over-predicted the long-term interest rate; 3. The EIA interest rate  
8 forecasts that Dr. Vander Weide heavily relied on to derive his estimates of  
9 ROE are not credible as shown by the performance of historical forecasts; and  
10 4. After correcting the problem of the misuse of the interest rate to Dr. Vander  
11 Weide's estimation results, I obtained much lower and much more reasonable  
12 estimates of ROE.

1 Q. DO YOU HAVE ANY CONCERNS WITH DR. VANDER WEIDE'S  
2 DIVIDEND YIELD ADJUSTMENTS IN HIS DCF MODEL?

3 A. Yes. Dr. Vander Weide calculated the expected dividend yield by applying the  
4 short-term growth rate to the current dividend yield. The application of the DCF  
5 model requires the use of long-term growth as the model assumes infinite  
6 investment horizon for an investor. Investors look at the sustainable long-term  
7 growth rates longer than the typical three- to five-year periods that analysts use.  
8 Dr. Vander Weide's dividend growth does not reflect the true long-term growth  
9 rate. In this sense, Dr. Vander Weide's DCF estimate over-estimated the  
10 required return on equity. In comparison, I have added a GDP growth  
11 component in the long-term growth projections which would reflect the long-  
12 term growth prospect of the companies better. Thus, I believe my estimates of  
13 ROE from the DCF models are more just and reasonable.

14 Q. WHY SHOULD THE COMPANY NOT BE ALLOWED TO RECOVER  
15 FLOTATION COSTS?

16 A. Dr. Vander Weide recommended that the Company should be compensated for  
17 its flotation cost. He allowed a 5% reduction to the stock price in the DCF model  
18 and added 20 basis points to the results of required returns from the CAPM and  
19 other models for accommodating the flotation costs.

20 Flotation costs are the costs related to the sale of new issues of company  
21 common stocks, including the preparation, filing, underwriting of the new  
22 issuance, and other related costs. There are several reasons why flotation costs  
23 should not be included to increase the return on equity of a subsidiary such as

1 DESC. DESC's ratepayers should not bear the burden of Dominion's previous  
2 issuance of stocks. If the Company has experienced flotation costs, it would  
3 already be included in the Company's expense schedule. Furthermore, capital  
4 market should have already factored in the transaction costs as the underwriting  
5 fees are known to the investors. Investors should have already considered this  
6 information when pricing the stocks they are purchasing, and they should not  
7 be compensated twice.

8 Q. PLEASE EXPLAIN THE DOUBLE LEVERAGE ISSUE.

9 A. DESC does not issue its own equity, but it can have paid-in capital from its  
10 parent DE as equity. The source of paid-in capital from its parent company DE  
11 cannot be clearly distinguished from either an equity issuance or a debt issuance  
12 directly. Even if the parent company directly issues equity for the equity  
13 infusion into the subsidiary, one still cannot exclusively bind the infusion with  
14 the equity issuance due to the inseparability of capital.

15 When a parent company issues debt and then uses the proceeds from the  
16 debt issuance as the paid-in capital to the subsidiary, a double leverage issue  
17 arises. The debt investors are compensated at a lower rate of return compared  
18 to the equity investors; thus, the parent company will receive return on equity  
19 from the subsidiary for their debt. If double leverage is allowed, then ratepayers  
20 will pay a higher than required return on equity, when the underlying capital is  
21 originated from the issuance of debt.

22 Q. DID DESC EXPLICITLY STATE THAT THE COMPANY DOES NOT  
23 INTEND TO RECOVER EQUITY ISSUANCE COSTS IN THIS CASE?

1 A. Yes, in its response to DoD/FEA 5-2 (see Exhibit No.\_\_(ZZ-9)), DESC stated  
2 specifically “no costs of [DE] equity issuances in 2019 were associated with  
3 DESC.” DESC further stated “no costs of equity issuances are being included  
4 for recovery in this case”. However, Dr. Vander Weide specifically included  
5 floatation cost in his ROE recommendation, contradicting the Company’s  
6 statements.

7 For these reasons, flotation cost should be disallowed as a part of ROE.

8 Q. DO YOU HAVE PROBLEMS WITH DR. VANDER WEIDE’S MODELING  
9 OF ROE USING THE COMPARABLE EARNINGS MODEL?

10 A. Yes, I have problems with Dr. Vander Weide’s modeling of ROE using a  
11 comparable earnings model. In this case, Dr. Vander Weide collected  
12 information on comparable companies’ expected returns on book value. This  
13 approach is problematic as investors require a fair return on market value of  
14 equity, not book value, because investors cannot buy stocks at book value.  
15 Precisely for this reason, FERC has rejected CE or Expected Earnings models  
16 as a method to estimate the market required return on equity. FERC stated:

17 The Commission explained that the return on book value is  
18 not indicative of what return an investor requires to invest  
19 in the utility’s equity or what return an investor receives on  
20 the equity investment, because those returns are determined  
21 with respect to the current market price that an investor  
22 must pay in order to invest in the equity. Specifically, the  
23 Commission found that the Expected Earnings model  
24 measures returns on book value, without consideration of  
25 what market price an investor would have to pay to invest  
26 in the relevant company, so it does not accurately measure

1 the investor's expected returns on its investment, and,  
2 therefore, has been "thoroughly discredited."<sup>21</sup>  
3

4 Q. DO YOU AGREE WITH DR. VANDER WEIDE'S ADJUSTMENT OF THE  
5 COMPARABLE EARNINGS ANALYSIS FOR MARKET VALUE  
6 CAPITAL STRUCTURE?

7 A. No, the ROE from the CE analysis is a return on book value. However, when  
8 Dr. Vander Weide adjusted his ROE obtained from the DCF (market value),  
9 CAPM (market value), RP (market value), and CE (book value) by using a  
10 market value capital structure adjustment, he adjusted upward the ROE from  
11 CE. His argument for the adjustment is that while the ROEs are based on market  
12 returns, the capital structure was based on book values; thus, the market value-  
13 based ROEs need to be adjusted for the difference between book value capital  
14 structure and market value capital structure. The CE analysis is already a book  
15 value-based analysis, not a market value-based required return. Incorrectly  
16 adjusting the book value ROE upward results in a misleadingly high ROE, even  
17 if one agrees with the so-called market value capital structure adjustment.

18 Q. DID DR. VANDER WEIDE ADJUST HIS ESTIMATED REQUIRED RATE  
19 OF RETURN ON EQUITY UPWARD IN THE LAST STEP OF HIS ROE  
20 ESTIMATION?

21 A. Yes, He did. Dr. Vander Weide claims that the ROE he obtained from the  
22 models are market required returns. The weighted average cost of capital  
23 (WACC) is typically obtained by weighting the returns on long-term debt and

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<sup>21</sup> FERC Opinion No. 569-A, Order on Rehearing, (Issued May 21, 2020). Para 117, page 51.  
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1 return on equity by respective book value share of the debt and equity.  
2 Therefore, he calculated the market weighted cost of capital by applying the  
3 after-tax cost of return on debt and equity to the market value capital structure,  
4 and then applied the marketed WACC to the book value capital structure to  
5 back out the needed ROE for book value capital structure. As his calculated  
6 equity ratio in the market value capital structure is higher than the equity ratio  
7 in the book value capital structure, the required ROE is adjusted upward. For  
8 example, he showed in Exhibit No. \_\_\_\_ (JWV-2), his model-generated ROE of  
9 9.8% has been adjusted upward to 10.4% assuming a market equity ratio of  
10 60% versus the book value equity ratio of 53.35% as proposed by the Company.

11 Q. DO YOU AGREE WITH THE ADJUSTMENT?

12 A. No, I do not agree with his adjustment. In making the market value capital  
13 structure adjustment, Dr. Vander Weide calculated the market value capital  
14 structure (see Exhibit No. \_\_\_\_ (JWV-16)). However, his market value capital  
15 structure is calculated incorrectly and thus, his market value capital structure is  
16 not the correct market value capital structure. In addition, there are sound  
17 reasons why book value capital structure has been used in practically all rate  
18 proceedings.

19 Q. CAN YOU EXPLAIN WHY DR. VANDER WEIDE'S MARKET VALUE  
20 CAPITAL STRUCTURE IS NOT THE CORRECT MARKET VALUE  
21 CAPITAL STRUCTURE?

22 A. Yes. Dr. Vander Weide used end-of-year stock market capitalization of the  
23 utility companies as the market value of equity, which I agree is an acceptable

1 measure of market value of equity. However, Dr. Vander Weide used the end-  
2 of-year book value of long-term debt as the market value of the debt, which is  
3 erroneous. The source of Dr. Vander Weide's long-term debt data is *Value Line*  
4 and the *Value Line* long-term debt is book value-based.

5 Q. IS THERE A MARKET VALUE OF DEBT?

6 A. Yes, when the yield (market interest rate) is different from the coupon rate of  
7 the debt/bond, the market value and book value of debt/bond will be different.  
8 When the coupon rate is the same as the market yield, the book value of the  
9 debt and market value of the debt would be the same. However, when the  
10 interest rate is lower than the coupon rate of the debt, the bond price (market  
11 value) will increase and be higher than the book value.

12 The coupon payment (interest payment on the bond) stays the same  
13 throughout the life of the debt. However, when the market interest rate goes  
14 down, investors will be attracted to buy more of the debt instrument that is  
15 generating more income, thus driving up the price/value of the debt. In this case,  
16 the book value of the bond will be lower than the market value of the bond.

17 Dr. Vander Weide used the book value for the market value of the debt.  
18 Implicitly, he was assuming that the embedded cost of the debt is the same as  
19 the market yield; however, there is no evidence that these two are the same.

20 Q. DO YOU AGREE THAT THE BOOK VALUE CAPITAL STRUCTURE  
21 HAS BEEN THE BASIS FOR CALCULATING THE COST OF CAPITAL  
22 IN RATE PROCEEDINGS?

1 A. Yes, I believe that using the book value capital structure has been the standard  
2 in rate making processes. When determining the overall cost of capital,  
3 embedded cost of debt, and market-value based cost of equity are weighted by  
4 the book value of debt and equity respectively. There are several reasons why  
5 this has been in existence in rate making process. As Dr. Morin stated:<sup>22</sup>

6 The rationale for using embedded cost of debt is that the  
7 award of a rate of return on rate base to cover market yield  
8 on debt would only result in windfall gains or losses to  
9 shareholders. That is, if market yields exceed embedded  
10 costs, rate coverage of the difference would not accrue to the  
11 bondholders, but rather to the shareholders, because of the  
12 contractual fixity of bondholders' claims. Any excess of  
13 market over book costs of debt falls upon the shareholders,  
14 and conversely. By allowing the utility to earn its actual  
15 embedded cost and equity earnings equal to the cost of  
16 equity times the equity book value, regulators prevent  
17 shareholders from windfall gains and losses when interest  
18 rate change.

19  
20 Additionally,

21  
22 First, the relationship of debt and equity at book value is an  
23 expression of the utility's long-term target capital structure  
24 policy. If incremental funds are raised in proportions such  
25 that a target debt/equity ratio in book value terms is  
26 maintained, the earnings requirements to cover capital costs  
27 must be computed using the actual weights in which funds  
28 are raised, that is, book value weights. Second, book value  
29 proportions are much more stable relative to market values.  
30 Hence, their presentation to regulatory authority avoids the  
31 vagaries introduced by variability of market values. Lastly,  
32 if regulation performs adequately, the book value and market  
33 value of equity will eventually be driven towards equality  
34 under ideal conditions.  
35

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<sup>22</sup> Roger A. Morin, New Regulatory Finance, Public Utilities Reports, Inc., 2006, pages 451-452.  
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1 Dr. Morin also stated that “It is almost universal practice to employ a  
2 hybrid computation consisting of embedded costs of debt and market-based cost  
3 of equity, with costs of debt and equity both weighted at their respective book  
4 values in the determination of the WACC”.<sup>23</sup>

5  
6 IX. CONCLUSIONS

7 Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY AT THIS TIME?

8 A. Yes, it does.

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<sup>23</sup> Roger A. Morin, New Regulatory Finance, Public Utilities Reports, Inc., 2006, pages 452.  
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**EDUCATION:**

Ph.D., Economics, University of Michigan, 1994  
M.A., Economics, Bowling Green State University, 1987  
B.A., Business Administration, People's University of China, 1985

**EXPERIENCE RECORD:**

2000-Present C. H. Guernsey & Company, Oklahoma City, Okla.

Dr. Zhu is an Economist specializing in the areas of cost of capital and cost of service analysis for electric and gas utilities. He has provided analyses and support in many public utility (both electric and gas) cost-of-capital cases and cost of service cases. He has been providing consulting services on behalf of the State Water Project of California (an Intervenor) in the Southern California Edison, Pacific Gas & Electric, and San Diego Gas & Electric Transmission Formula rate cases. Most recently, he is involved with providing consulting services to the ongoing Duke Energy Progress rate case intervention for the US Army.

Dr. Zhu also specialized in areas such as load forecasting, natural gas market analysis and modeling, gas price and underground storage forecasting, risk management and hedging strategy, financial analysis of merger potential, and other economic and statistical analyses. He has performed various studies regarding natural gas market risk management, price and volatility determination, market efficiency, and the analysis of gas pipelines. He has also performed numerous power price analyses, load analyses, weather normalization, and demand and energy forecasts for electric IOUs and cooperatives, evaluation of solar energy projects, corporate merger activities, stock market and foreign exchange market volatility, and financial market deregulation. Dr. Zhu has been instrumental in successfully modeling the storage injections and withdrawals from the U.S. natural gas reservoirs and the impact of these net supply changes on natural gas prices. Dr. Zhu and other Guernsey economists have received national recognition for successfully modeling the prices of natural gas in the physical market and at many trading hubs used in pricing natural gas in today's markets.

Dr. Zhu has testified in cases before several public service commissions regarding cost of capital, long-term demand and load forecasts, fuel price projections, and other issues.

Dr. Zhu is also Dr. Michael Metzger Endowed Chair and Professor of Economics at the University of Central Oklahoma.

Dr. Zhu teaches Master's level Energy Finance courses (Energy Valuation and Investment, Trading, and Risk Management) for the Mewbourne School of Petroleum and Geological Engineering and International Finance, Trade, and other courses for Advanced Programs at the University of Oklahoma.

**SPECIFIC EXPERIENCE:**

**Natural Gas**

Dr. Zhu has developed and maintains natural gas futures contract pricing models and natural gas storage models. He has also developed and maintained natural gas pricing models for multiple delivery points for a large Texas-based electric distribution cooperative and several other

cooperatives. Dr. Zhu devised hedging strategies for several utilities and has done extensive study of natural gas price and natural gas markets.

### **Cost of Capital**

Dr. Zhu has provided testimony and support in many gas and electric utility cost of capital cases.

Dr. Zhu has assisted Department of Defense on Duke Energy Progress rate case in North Carolina on cost of capital and capital structure issues, DOCKET NO. E-2, SUB 1219, 2019-2020.

Dr. Zhu has assisted clients in Illinois on cases pending at FERC on ROE issues based on the new FERC ROE methodology.

Dr. Zhu has been providing consulting services, specifically related to capital structure and return on equity, to and on behalf of the State Water Project of California (an Intervenor) in the Southern California Edison, Pacific Gas & Electric, and San Diego Gas & Electric Transmission Formula rate cases. Teaming with legal counsel, Dr. Zhu represents and negotiates on behalf of client at settlement conferences conducted at FERC in Washington DC.

Dr. Zhu testified on cost of capital on behalf of Michigan Attorney General's Office before Michigan Public Service Commission in the Matter of the Application of Indiana Michigan Power Company for authority to increase its rates in the sale of electricity energy and for approval of depreciation accrual rates and other related matters, Case No. U-18370, 2017.

In addition, Dr. Zhu has studied the connection of the U.S. economy and U.S. gas and electric utility return on equities, and the determination of the ROE. The studies have been published in trade, industrial, and academic journals.

### **Load Forecasting & Statistical Analysis, and other Financial and Economic Analysis**

Dr. Zhu examined factors determining future fuel prices and loads, and then provided expert testimony services related to fuel prices and load forecasts for the following projects:

Dr. Zhu testified on energy and demand forecasts, and fuel price forecast issues before the Georgia Public Service Commission in Georgia Power Company's application for Approval of its 2007 Integrated Resource Plan, Docket No. 24505-U, 2007.

Dr. Zhu presented expert testimony before the Oklahoma Corporation Commission on fuel cost/pricing issues, providing rebuttal testimony before the Corporation Commission of the State of Oklahoma, in the Application of Blue Canyon Windpower II, LLC for establishment of purchased power rates and a purchase power contract with DUKE – Public Service Company of Oklahoma, pursuant to PURPA, Cause No. PUD 20030063, 2004.

Dr. Zhu presented expert testimony before the South Carolina Public Service Commission Docket No. 2008-196-E: "Combined Application of SCE&G for the Construction and Operation of a Nuclear Facility in Jenkinsville, S. Car." regarding load forecast and fuel forecast issues.

Dr. Zhu has performed numerous studies of financial markets and published extensively in financial economics, energy economics and other economics/finance fields.

Dr. Zhu studied the impact of government regulation on stock price volatilities using the event study methodology and the study was published in Journal of Financial Services Review and many other journals.

Dr. Zhu has used many time series models to study the financial prices including exchange rates, stock prices, and natural gas futures prices and so on. The studies have been published in many leading academic journals.

### **Other Consulting Experience**

Dr. Zhu developed and maintained GUERNSEY's LDC, DisCo, and GenCo stock price indices, developed fuel cost and hedging strategies for utilities, and developed and maintains load forecast models.

Dr. Zhu has been involved in the inventory forecast system development, merger intervention projects for gas and electric utilities, integrated resource planning projects, survey design and statistical analysis, weather normalization studies and many others.

### **Previous Professional Experience:**

Dr. Zhu has served as an Assistant Professor of Economics at The University of Oklahoma, a Research Fellow of Financial Research Institute at the University of Missouri, and as an Instructor and Teaching Assistant in the Department of Economics at the University of Michigan.

### **SELECTED RECENT PUBLICATIONS AND PROFESSIONAL PAPERS**

- Zhu, Zhen, with Sheng-Hung Chen, Song-Zan Chiou-Wei, forthcoming. "Natural Gas Price, Market Fundamentals and Hedging Effectiveness", *Quarterly Review of Economics and Finance*.
- Zhu, Zhen, with Sheng-Hung Chen, Song-Zan Chiou-Wei, 2019. "Energy and Agricultural Commodity Markets Interaction: An Analysis of Crude Oil, Natural Gas, Corn, Soybean, and Ethanol Prices." *The Energy Journal*, Volume 40, Number 2, pages 265-296.
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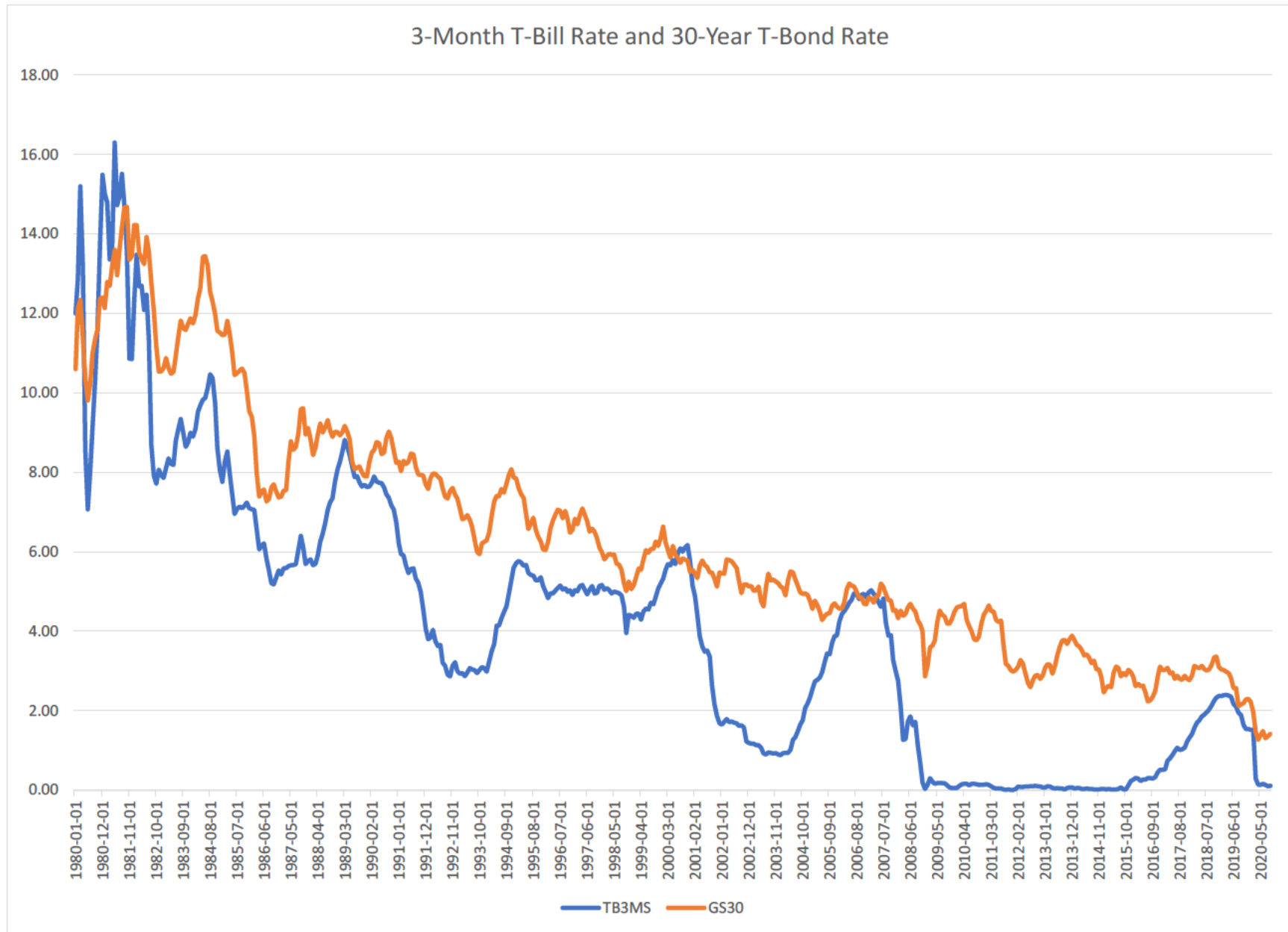
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#### PROFESSIONAL ACTIVITIES / HONORS:

Barnabas Fellow, UCO, 2011-2012  
Distinguished Paper Award, Association of Public and Business Administration, 2008  
Faculty Research Merit Award, UCO, 2007, 2009, 2011  
OSEHE-EPSCor Summer grant Writing Institute, UCO, 2008  
Faculty Incentive Awards, Graduate College, UCO, 2007, 2008, 2009  
McGraw-Hill Irwin Distinguished Paper Award, Southwestern Society of Economists, 2006.  
Marquis' Who's Who in American Education, 2003.  
Research Fellow, Financial Research Institute, University of Missouri, 2001, 2002.  
Hauptman Fellow, University of Central Oklahoma, 2001.  
Distinguished Researcher Award, College of Business, University of Central Oklahoma, 2002.  
Marquis Who's Who in America: Finance and Industry, 1999  
ODE Professor of the Year, 1997-1998, University of Oklahoma  
Member, American Finance Association, International Association for Energy Economists



| Zhu Proxy Group                        |      | Common Equity Ratio |       |       |       |       |       |       |       |       |       |       |       |           |
|--|------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|
|  |      | 2010                | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  | 2021  | 2023-2025 |
| 1 Allete Inc                           | ALE  | 55.8                | 55.7  | 56.3  | 55.4  | 55.8  | 53.7  | 58    | 59    | 60.1  | 61.4  | 59    | 60    | 59        |
| 2 Alliant Energy Corp                  | LNT  | 49.5                | 50.9  | 48.4  | 50.8  | 47.5  | 51.4  | 47.2  | 48.6  | 46.6  | 48.5  | 48    | 48    | 48        |
| 3 Ameren Corp                          | AEE  | 50.9                | 53.7  | 49.4  | 53.7  | 51.7  | 49.7  | 51.3  | 49.8  | 48.8  | 47.1  | 45.5  | 47    | 49        |
| 4 American Electric Power Company Inc  | AEP  | 46.7                | 49.3  | 49.4  | 48.9  | 51    | 50.2  | 50    | 48.5  | 46.8  | 43.9  | 44    | 46    | 48        |
| 5 AVANGRID Inc.                        | AGR  | 0                   | 0     | 0     | 0     | 83.2  | 76.9  | 77    | 74.4  | 73.8  | 69.4  | 66    | 63.5  | 57.5      |
| 6 Avista Corp                          | AVA  | 48.4                | 48.6  | 49.2  | 48.6  | 49    | 50    | 48.8  | 52.8  | 49.5  | 50.6  | 49.5  | 50.5  | 49        |
| 7 Black Hills Corp                     | BKH  | 48.1                | 48.6  | 56.8  | 48.4  | 52.1  | 44    | 33.5  | 35.5  | 42.5  | 42.9  | 45    | 46.5  | 48        |
| 8 CenterPoint Energy                   | CNP  | 26.2                | 32.8  | 34    | 35.6  | 36.2  | 30.5  | 31.5  | 36.4  | 37.5  | 29.1  | 31.5  | 36    | 42        |
| 9 CMS Energy Corp                      | CMS  | 29.5                | 32.6  | 31.6  | 32.2  | 31    | 31.4  | 32.6  | 32.4  | 30.7  | 29.4  | 29.5  | 30    | 32        |
| 10 Consolidated Edison Inc             | ED   | 50.4                | 52.5  | 54.1  | 53.9  | 52    | 52.1  | 49.2  | 51.1  | 48.9  | 49.3  | 50.5  | 50    | 50        |
| 11 Dominion Energy                     | D    | 42.8                | 39.3  | 38.2  | 37.3  | 34.8  | 34.9  | 32.6  | 35.6  | 39.2  | 45    | 46    | 45.5  | 50        |
| 12 DTE Energy Company                  | DTE  | 48.7                | 49.4  | 51.2  | 52.3  | 50    | 49.8  | 44.4  | 43.8  | 45.8  | 42.3  | 40    | 40    | 41.5      |
| 13 Duke Energy Corp                    | DUK  | 55.7                | 54.9  | 52.9  | 52    | 52.3  | 51.4  | 47.4  | 46    | 46.2  | 44.1  | 45.5  | 45.5  | 45        |
| 14 Edison International                | EIX  | 44.3                | 40.6  | 46.2  | 46.2  | 47.2  | 46.7  | 49.2  | 45.8  | 38.3  | 39.9  | 40.5  | 39.5  | 37.5      |
| 15 Entergy Corp                        | ETR  | 42.1                | 46.4  | 42.9  | 43.6  | 43.8  | 40.8  | 35.5  | 35.5  | 35.9  | 37.1  | 36    | 36    | 39.5      |
| 16 Evergy                              | EVRG | 0                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 60    | 49.4  | 48.5  | 47.5  | 46.5      |
| 17 Eversource Energy                   | ES   | 43.6                | 45.3  | 55.4  | 54.8  | 53.2  | 53.6  | 54.4  | 48.2  | 46.9  | 46.6  | 48    | 47.5  | 46.5      |
| 18 Exelon Corp                         | EXC  | 52.9                | 54    | 53.5  | 55.2  | 52.8  | 51.3  | 44.5  | 47.8  | 47.2  | 50.4  | 48    | 49.5  | 50        |
| 19 FirstEnergy                         | FE   | 40.5                | 45.8  | 46.3  | 44.5  | 39.1  | 39.3  | 25.5  | 15.7  | 27.4  | 26.2  | 25    | 27.5  | 34        |
| 20 Fortis Inc                          | FTS  | 33.5                | 36.9  | 35.1  | 37    | 35.7  | 38.1  | 36.2  | 37.1  | 37.2  | 41.8  | 41.5  | 41.5  | 43.5      |
| 21 Hawaiian Electric Industries Inc    | HE   | 54.3                | 53.9  | 53.1  | 55    | 53.8  | 55.5  | 57.5  | 55.7  | 51.7  | 54.6  | 52    | 53    | 51.5      |
| 22 IDACORP Inc                         | IDA  | 50.7                | 54.4  | 54.5  | 53.4  | 54.7  | 54.4  | 55.2  | 56.3  | 56.4  | 58.7  | 54    | 54    | 53.5      |
| 23 NextEra Energy                      | NEE  | 44.5                | 41.8  | 40.9  | 42.9  | 45    | 45.8  | 46.7  | 47.3  | 56    | 49.6  | 49.5  | 49    | 50.5      |
| 24 NorthWestern Corporation            | NWE  | 42.8                | 47.8  | 46.2  | 46.5  | 46.6  | 46.9  | 48    | 49.8  | 47.8  | 47.5  | 51    | 49    | 50        |
| 25 OGE Energy Corp                     | OGE  | 49.2                | 48.4  | 49.3  | 56.9  | 54.1  | 55.7  | 58.9  | 58.3  | 58    | 56.4  | 51    | 52    | 51        |
| 26 Otter Tail Corp                     | OTTR | 58.4                | 54    | 54.4  | 57.9  | 53.5  | 57.6  | 57    | 58.7  | 55.3  | 53.1  | 58    | 55    | 53        |
| 27 PNM Resources                       | PNM  | 49.2                | 48.1  | 48.7  | 49.7  | 51.9  | 45.5  | 44    | 43.6  | 38.6  | 39.9  | 51    | 46    | 49        |
| 28 PPL Corporation                     | PPL  | 39.8                | 37.2  | 35.9  | 37.7  | 42    | 34.8  | 35.7  | 35.2  | 36.7  | 38.5  | 40    | 40.5  | 42.5      |
| 29 Public Service Enterprise Group Inc | PEG  | 55.2                | 57.9  | 61.7  | 59.6  | 59.6  | 59.7  | 54.7  | 53.4  | 52.2  | 52.3  | 52    | 51.5  | 50        |
| 30 Sempra                              | SRE  | 49.6                | 49.2  | 46.7  | 49.4  | 48.2  | 47.3  | 47.3  | 43.5  | 38.4  | 43.4  | 47    | 51.5  | 51.5      |
| 31 Southern Co                         | SO   | 45.7                | 47.1  | 47.3  | 45.8  | 47.3  | 44    | 35.7  | 35    | 37.6  | 39.5  | 38.5  | 39    | 39.5      |
| 32 WEC Energy Group                    | WEC  | 49                  | 46    | 48    | 49.1  | 51.2  | 48.6  | 49.3  | 51.9  | 49.4  | 47.4  | 49.5  | 47    | 48        |
| 33 Xcel Energy Inc                     | XEL  | 46.3                | 48.9  | 46.7  | 46.7  | 47    | 45.9  | 43.7  | 44.1  | 43.6  | 43.2  | 43    | 43    | 42.5      |
| Average                                |      | 43.69               | 44.47 | 44.93 | 45.45 | 47.70 | 46.61 | 44.96 | 44.77 | 46.48 | 46.10 | 46.28 | 46.41 | 47.08     |
| Median                                 |      | 48.25               | 48.25 | 48.55 | 49    | 50.5  | 49.15 | 47.35 | 47.55 | 46.85 | 46.85 | 48    | 47.25 | 48.5      |

| Common Equity Ratio |                                     |      |       |       |       |       |       |       |       |       |       |       |       |           |       |
|---------------------|-------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|-------|
|                     | Vander Weide Proxy Group            |      |       |       |       |       |       |       |       |       |       |       |       |           |       |
|                     |                                     | 2010 | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  | 2021  | 2023-2025 |       |
| 1                   | Allete Inc                          | ALE  | 55.8  | 55.7  | 56.3  | 55.4  | 55.8  | 53.7  | 58    | 59    | 60.1  | 61.4  | 59    | 60        | 59    |
| 2                   | Alliant Energy Corp                 | LNT  | 49.5  | 50.9  | 48.4  | 50.8  | 47.5  | 51.4  | 47.2  | 48.6  | 46.6  | 48.5  | 48    | 48        | 48    |
| 3                   | Ameren Corp                         | AEE  | 50.9  | 53.7  | 49.4  | 53.7  | 51.7  | 49.7  | 51.3  | 49.8  | 48.8  | 47.1  | 45.5  | 47        | 49    |
| 4                   | American Electric Power Company Inc | AEP  | 46.7  | 49.3  | 49.4  | 48.9  | 51    | 50.2  | 50    | 48.5  | 46.8  | 43.9  | 44    | 46        | 48    |
| 5                   | AVANGRID Inc.                       | AGR  | 0     | 0     | 0     | 0     | 83.2  | 76.9  | 77    | 74.4  | 73.8  | 69.4  | 66    | 63.5      | 57.5  |
| 6                   | Avista Corp                         | AVA  | 48.4  | 48.6  | 49.2  | 48.6  | 49    | 50    | 48.8  | 52.8  | 49.5  | 50.6  | 49.5  | 50.5      | 49    |
| 7                   | Black Hills Corp                    | BKH  | 48.1  | 48.6  | 56.8  | 48.4  | 52.1  | 44    | 33.5  | 35.5  | 42.5  | 42.9  | 45    | 46.5      | 48    |
| 8                   | CMS Energy Corp                     | CMS  | 29.5  | 32.6  | 31.6  | 32.2  | 31    | 31.4  | 32.6  | 32.4  | 30.7  | 29.4  | 29.5  | 30        | 32    |
| 9                   | Consolidated Edison Inc             | ED   | 50.4  | 52.5  | 54.1  | 53.9  | 52    | 52.1  | 49.2  | 51.1  | 48.9  | 49.3  | 50.5  | 50        | 50    |
| 10                  | Dominion Energy                     | D    | 42.8  | 39.3  | 38.2  | 37.3  | 34.8  | 34.9  | 32.6  | 35.6  | 39.2  | 45    | 46    | 45.5      | 50    |
| 11                  | DTE Energy Company                  | DTE  | 48.7  | 49.4  | 51.2  | 52.3  | 50    | 49.8  | 44.4  | 43.8  | 45.8  | 42.3  | 40    | 40        | 41.5  |
| 12                  | Duke Energy Corp                    | DUK  | 55.7  | 54.9  | 52.9  | 52    | 52.3  | 51.4  | 47.4  | 46    | 46.2  | 44.1  | 45.5  | 45.5      | 45    |
| 13                  | Edison International                | EIX  | 44.3  | 40.6  | 46.2  | 46.2  | 47.2  | 46.7  | 49.2  | 45.8  | 38.3  | 39.9  | 40.5  | 39.5      | 37.5  |
| 14                  | Entergy Corp                        | ETR  | 42.1  | 46.4  | 42.9  | 43.6  | 43.8  | 40.8  | 35.5  | 35.5  | 35.9  | 37.1  | 36    | 36        | 39.5  |
| 15                  | Eversource Energy                   | ES   | 43.6  | 45.3  | 55.4  | 54.8  | 53.2  | 53.6  | 54.4  | 48.2  | 46.9  | 46.6  | 48    | 47.5      | 46.5  |
| 16                  | Fortis Inc                          | FTS  | 33.5  | 36.9  | 35.1  | 37    | 35.7  | 38.1  | 36.2  | 37.1  | 37.2  | 41.8  | 41.5  | 41.5      | 43.5  |
| 17                  | Hawaiian Electric Industries Inc    | HE   | 54.3  | 53.9  | 53.1  | 55    | 53.8  | 55.5  | 57.5  | 55.7  | 51.7  | 54.6  | 52    | 53        | 51.5  |
| 18                  | MGE Energy Inc                      | MGEE | 61.1  | 60.4  | 61.8  | 60.7  | 62.5  | 63.8  | 65.4  | 66.2  | 62.3  | 62    | 66    | 66        | 63.5  |
| 19                  | NextEra Energy                      | NEE  | 44.5  | 41.8  | 40.9  | 42.9  | 45    | 45.8  | 46.7  | 47.3  | 56    | 49.6  | 49.5  | 49        | 50.5  |
| 20                  | NorthWestern Corporation            | NWE  | 42.8  | 47.8  | 46.2  | 46.5  | 46.6  | 46.9  | 48    | 49.8  | 47.8  | 47.5  | 51    | 49        | 50    |
| 21                  | OGE Energy Corp                     | OGE  | 49.2  | 48.4  | 49.3  | 56.9  | 54.1  | 55.7  | 58.9  | 58.3  | 58    | 56.4  | 51    | 52        | 51    |
| 22                  | Otter Tail Corp                     | OTTR | 58.4  | 54    | 54.4  | 57.9  | 53.5  | 57.6  | 57    | 58.7  | 55.3  | 53.1  | 58    | 55        | 53    |
| 23                  | Pinnacle West                       | PNW  | 54.7  | 55.9  | 55.4  | 60    | 59    | 57    | 54.4  | 51.1  | 53    | 52.9  | 47    | 47        | 46.5  |
| 24                  | PNM Resources                       | PNM  | 49.2  | 48.1  | 48.7  | 49.7  | 51.9  | 45.5  | 44    | 43.6  | 38.6  | 39.9  | 51    | 46        | 49    |
| 25                  | Portland General Electric Company   | POR  | 47    | 50.4  | 52.9  | 48.7  | 47.3  | 52.2  | 51.6  | 49.9  | 53.5  | 48.7  | 47.5  | 46.5      | 47.5  |
| 26                  | PPL Corporation                     | PPL  | 39.8  | 37.2  | 35.9  | 37.7  | 42    | 34.8  | 35.7  | 35.2  | 36.7  | 38.5  | 40    | 40.5      | 42.5  |
| 27                  | Public Service Enterprise Group Inc | PEG  | 55.2  | 57.9  | 61.7  | 59.6  | 59.6  | 59.7  | 54.7  | 53.4  | 52.2  | 52.3  | 52    | 51.5      | 50    |
| 28                  | Sempra                              | SRE  | 49.6  | 49.2  | 46.7  | 49.4  | 48.2  | 47.3  | 47.3  | 43.5  | 38.4  | 43.4  | 47    | 51.5      | 51.5  |
| 29                  | Southern Co                         | SO   | 45.7  | 47.1  | 47.3  | 45.8  | 47.3  | 44    | 35.7  | 35    | 37.6  | 39.5  | 38.5  | 39        | 39.5  |
| 30                  | WEC Energy Group                    | WEC  | 49    | 46    | 48    | 49.1  | 51.2  | 48.6  | 49.3  | 51.9  | 49.4  | 47.4  | 49.5  | 47        | 48    |
| 31                  | Xcel Energy Inc                     | XEL  | 46.3  | 48.9  | 46.7  | 46.7  | 47    | 45.9  | 43.7  | 44.1  | 43.6  | 43.2  | 43    | 43        | 42.5  |
|                     | Average                             |      | 44.51 | 45.02 | 45.62 | 46.10 | 48.77 | 48.19 | 47.19 | 46.90 | 48.65 | 48.01 | 48.14 | 47.86     | 48.05 |
|                     | Median                              |      | 48.25 | 48.6  | 49.35 | 49.3  | 51.35 | 50.1  | 49    | 48.55 | 48.3  | 48    | 48    | 47.25     | 48.5  |

| DCF Analysis - IBES Earnings Estimates |                                     |   |                                |                                 |                    |                    |
|--|-------------------------------------|---|--------------------------------|---------------------------------|--------------------|--------------------|
|  |                                     | Adjusted Dividend<br>[1]                      | Earnings Growth by IBES<br>[2] | Adjusted Earnings Growth<br>[3] | [4]                | [5]                |
|  | Company                             | Adjusted Dividend Yield<br>(IBES Growth Only) | IBES                           | Based on GDP and IBES           | ROE (Two Step DCF) | ROE (One-Step DCF) |
| 1                                      | Allete Inc                          | 4.640%  | 7.00%                          | 6.42%                           | 11.06%             | 11.64%             |
| 2                                      | Alliant Energy Corp                 | 3.075%  | 5.30%                          | 5.06%                           | 8.13%              | 8.37%              |
| 3                                      | Ameren Corp                         | 2.768%  | 6.00%                          | 5.62%                           | 8.39%              | 8.77%              |
| 4                                      | American Electric Power Company Inc | 3.585%  | 5.63%                          | 5.32%                           | 8.91%              | 9.22%              |
| 5                                      | AVANGRID Inc.                       | 4.102%  | 4.60%                          | 4.50%                           | 8.60%              | 8.70%              |
| 6                                      | Avista Corp                         | 4.473%  | 5.80%                          | 5.46%                           | 9.93%              | 10.27%             |
| 7                                      | Black Hills Corp                    | 3.755%  | 4.69%                          | 4.57%                           | 8.33%              | 8.45%              |
| 8                                      | CenterPoint Energy                  | 5.070%  | -6.65%                         | -4.50%                          |                    |                    |
| 9                                      | CMS Energy Corp                     | 2.857%  | 7.08%                          | 6.48%                           | 9.34%              | 9.94%              |
| 10                                     | Consolidated Edison Inc             | 4.119%  | 2.55%                          | 2.86%                           | 6.98%              | 6.67%              |
| 11                                     | Dominion Energy                     | 4.883%  | 2.74%                          | 3.01%                           | 7.89%              | 7.62%              |
| 12                                     | DTE Energy Company                  | 3.850%  | 5.95%                          | 5.58%                           | 9.43%              | 9.80%              |
| 13                                     | Duke Energy Corp                    | 4.656%  | 1.60%                          | 2.10%                           | 6.75%              | 6.26%              |
| 14                                     | Edison International                | 4.670%  | 1.40%                          | 1.94%                           | 6.61%              | 6.07%              |
| 15                                     | Entergy Corp                        | 4.002%  | 5.40%                          | 5.14%                           | 9.14%              | 9.40%              |
| 16                                     | Evergy                              | 3.658%  | 6.80%                          | 6.26%                           | 9.92%              | 10.46%             |
| 17                                     | Eversource Energy                   | 2.789%  | 6.44%                          | 5.97%                           | 8.76%              | 9.23%              |
| 18                                     | Exelon Corp                         | 3.885%  | -3.48%                         | -1.97%                          |                    |                    |
| 19                                     | FirstEnergy                         | 4.318%  | -2.40%                         | -1.10%                          |                    |                    |
| 20                                     | Fortis Inc                          |   |                                |                                 |                    |                    |
| 21                                     | Hawaiian Electric Industries Inc    | 3.648%  | 3.30%                          | 3.46%                           | 7.11%              | 6.95%              |
| 22                                     | IDACORP Inc                         | 2.999%  | 2.60%                          | 2.90%                           | 5.90%              | 5.60%              |
| 23                                     | NextEra Energy                      | 2.193%  | 8.14%                          | 7.33%                           | 9.52%              | 10.33%             |
| 24                                     | NorthWestern Corporation            | 4.447%  | 3.80%                          | 3.86%                           | 8.31%              | 8.25%              |
| 25                                     | OGE Energy Corp                     | 5.041%  | 2.40%                          | 2.74%                           | 7.78%              | 7.44%              |
| 26                                     | Otter Tail Corp                     | 3.951%  | 9.00%                          | 8.02%                           | 11.97%             | 12.95%             |
| 27                                     | PNM Resources                       | 3.064%  | 4.95%                          | 4.78%                           | 7.84%              | 8.01%              |
| 28                                     | PPL Corporation                     | 5.354%  | -16.20%                        | -12.14%                         |                    |                    |
| 29                                     | Public Service Enterprise Group Inc | 3.820%  | 1.47%                          | 1.99%                           | 5.81%              | 5.29%              |
| 30                                     | Sempra                              | 3.499%  | 6.27%                          | 5.83%                           | 9.33%              | 9.77%              |
| 31                                     | Southern Co                         | 4.829%  | 4.55%                          | 4.46%                           | 9.29%              | 9.38%              |
| 32                                     | WEC Energy Group                    | 2.843%  | 5.95%                          | 5.58%                           | 8.42%              | 8.79%              |
| 33                                     | Xcel Energy Inc                     | 2.692%  | 5.85%                          | 5.50%                           | 8.19%              | 8.54%              |
|  | Min                                 |   |                                |                                 | 5.81%              | 5.29%              |
|  | Max                                 |   |                                |                                 | 11.97%             | 12.95%             |
|  | Median                              |   |                                |                                 | <b>8.40%</b>       | <b>8.74%</b>       |
|  | Average                             | 3.87%   | 3.87%                          | 3.91%                           | <b>8.49%</b>       | <b>8.65%</b>       |
|  | Midpoint                            |   |                                |                                 | 8.89%              | 9.12%              |

- [1]. 6-month average dividend yield April 1 - Sept 30 2020 adjusted by growth rate based on IBES  
[2]. IBES Earnings growth projection from Yahoo.finance.com as of October 2, 2020.  
[3]. Adjusted earnings growth based on IBES\*0.8+ GDP Growth Rate\*0.2  
[4]. [1]+[3]  
[5]. [1]+[2]

| DCF Analysis -Value Line Earnings Estimates |                                     |   |  |                                    |                       |                       |
|---|-------------------------------------|---|--|------------------------------------|-----------------------|-----------------------|
|   |                                     | Adjusted<br>Dividend<br>[1]                               | Earnings Growth<br>by ValueLine<br>[2] | Adjusted<br>Earnings Growth<br>[3] | [4]                   | [5]                   |
|   | Company                             | Adjusted<br>Dividend Yield<br>(Value Line<br>Growth Only) | Value Line                             | Based on GDP<br>and Value Line     | ROE (Two Step<br>DCF) | ROE (One-Step<br>DCF) |
| 1   | Allete Inc                          | 4.532%  | 4.50%                                  | 4.42%                              | 8.95%                 | 9.03%                 |
| 2   | Alliant Energy Corp                 | 3.080%  | 5.50%                                  | 5.22%                              | 8.30%                 | 8.58%                 |
| 3   | Ameren Corp                         | 2.768%  | 6.00%                                  | 5.62%                              | 8.39%                 | 8.77%                 |
| 4   | American Electric Power Company Inc | 3.598%  | 6.00%                                  | 5.62%                              | 9.22%                 | 9.60%                 |
| 5   | AVANGRID Inc.                       | 4.079%  | 4.00%                                  | 4.02%                              | 8.10%                 | 8.08%                 |
| 6   | Avista Corp                         | 4.270%  | 1.00%                                  | 1.62%                              | 5.89%                 | 5.27%                 |
| 7   | Black Hills Corp                    | 3.713%  | 3.50%                                  | 3.62%                              | 7.33%                 | 7.21%                 |
| 8   | CenterPoint Energy                  | 5.648%  | 4.00%                                  | 4.02%                              | 9.67%                 | 9.65%                 |
| 9   | CMS Energy Corp                     | 2.869%  | 7.50%                                  | 6.82%                              | 9.69%                 | 10.37%                |
| 10  | Consolidated Edison Inc             | 4.137%  | 3.00%                                  | 3.22%                              | 7.36%                 | 7.14%                 |
| 11  | Dominion Energy                     | 4.896%  | 3.00%                                  | 3.22%                              | 8.11%                 | 7.90%                 |
| 12  | DTE Energy Company                  | 3.852%  | 6.00%                                  | 5.62%                              | 9.47%                 | 9.85%                 |
| 13  | Duke Energy Corp                    | 4.812%  | 5.00%                                  | 4.82%                              | 9.63%                 | 9.81%                 |
| 14  | Edison International                | 4.606%  | 0.00%                                  | 0.82%                              | 5.42%                 | 4.61%                 |
| 15  | Entergy Corp                        | 3.911%  | 3.00%                                  | 3.22%                              | 7.13%                 | 6.91%                 |
| 16  | Eversource Energy                   | 3.580%  | 4.50%                                  | 4.42%                              | 8.00%                 | 8.08%                 |
| 17  | Exelon Corp                         | 2.764%  | 5.50%                                  | 5.22%                              | 7.98%                 | 8.26%                 |
| 18  | Exelon Corp                         | 4.226%  | 5.00%                                  | 4.82%                              | 9.04%                 | 9.23%                 |
| 19  | FirstEnergy                         | 4.800%  | 8.50%                                  | 7.62%                              | 12.42%                | 13.30%                |
| 20  | Fortis Inc                          | 4.974%  | 2.50%                                  | 2.82%                              | 7.79%                 | 7.47%                 |
| 21  | Hawaiian Electric Industries Inc    | 3.585%  | 1.50%                                  | 2.02%                              | 5.60%                 | 5.08%                 |
| 22  | IDACORP Inc                         | 3.026%  | 3.50%                                  | 3.62%                              | 6.64%                 | 6.53%                 |
| 23  | NextEra Energy                      | 2.231%  | 10.00%                                 | 8.82%                              | 11.05%                | 12.23%                |
| 24  | NorthWestern Corporation            | 4.348%  | 1.50%                                  | 2.02%                              | 6.37%                 | 5.85%                 |
| 25  | OGE Energy Corp                     | 5.071%  | 3.00%                                  | 3.22%                              | 8.29%                 | 8.07%                 |
| 26  | Otter Tail Corp                     | 3.806%  | 5.00%                                  | 4.82%                              | 8.62%                 | 8.81%                 |
| 27  | PNM Resources                       | 3.094%  | 6.00%                                  | 5.62%                              | 8.71%                 | 9.09%                 |
| 28  | PPL Corporation                     | 6.549%  | 2.50%                                  | 2.82%                              | 9.37%                 | 9.05%                 |
| 29  | Public Service Enterprise Group Inc | 3.953%  | 5.00%                                  | 4.82%                              | 8.77%                 | 8.95%                 |
| 30  | Sempra                              | 3.622%  | 10.00%                                 | 8.82%                              | 12.44%                | 13.62%                |
| 31  | Southern Co                         | 4.757%  | 3.00%                                  | 3.22%                              | 7.98%                 | 7.76%                 |
| 32  | WEC Energy Group                    | 2.844%  | 6.00%                                  | 5.62%                              | 8.46%                 | 8.84%                 |
| 33  | Xcel Energy Inc                     | 2.696%  | 6.00%                                  | 5.62%                              | 8.31%                 | 8.70%                 |
|   | Min                                 |   |  |                                    | 5.42%                 | 4.61%                 |
|   | Max                                 |   |  |                                    | 12.44%                | 13.62%                |
|   | Median                              |   |  |                                    | <b>8.31%</b>          | <b>8.70%</b>          |
|   | Average                             | 3.94%   | 4.39%                                  | 4.33%                              | <b>8.44%</b>          | <b>8.54%</b>          |
|   | Midpoint                            |   |  |                                    | 8.93%                 | 9.11%                 |

- [1]. 6-month average dividend yield April 1 - Sept 30 2020 adjusted by growth rate based on Value Line  
[2]. Value Line Earnings growth projection July - September 2020  
[3]. Adjusted earnings growth based on ValueLine\*0.8+ GDP Growth Rate\*0.2  
[4]. [1]+[3]  
[5]. [1]+[2]

|                                   |              | Nominal GDP (\$ Billion) |        | Compounded<br>Annual Growth<br>Rate |
|-----------------------------------|--------------|--------------------------|--------|-------------------------------------|
|                                   |              | 2023                     | 2050   |                                     |
| <hr/>                             |              |                          |        |                                     |
| [1]. EIA                          |              |                          |        |                                     |
|                                   | Real GDP     | 20,761                   | 33,759 |                                     |
|                                   | GDP Deflator | 1.266                    | 2.2920 |                                     |
|                                   |              | 26,283                   | 77,376 | 4.08%                               |
| [2]. SSA Trustees Report          |              | 25,369                   | 75,119 | 4.10%                               |
| Average Projected GDP Growth Rate |              |                          |        | <b>4.09%</b>                        |

[1]. Energy Information Administration, Annual Energy Outlook 2020 (Jan 2020)

[2]. Social Security Administration, 2020 OASDI Trustees Report, Table VI.G6-Selected Economic Variables

| Symbol | Security  | Market<br>Capitalization<br>(billion) | Forward<br>Dividend<br>Yield | Trailing<br>Dividend<br>Yield | Projected<br>Next 5 Year<br>Earning<br>Growth Rate<br>by IBES (%) | Adjusted<br>dividend<br>yield | ROE by DCF | Weighted<br>ROE |
|--------|---|---------------------------------------|------------------------------|-------------------------------|---|-------------------------------|------------|-----------------|
| MMM    | 3M Company  | 92.676                                | 3.7                          | 3.67                          | 2.68  | 3.768                         | 6.448      | 0.03040         |
| ABT    | Abbott Laboratories   | 189.553                               | 1.33                         | 1.29                          | 14.9  | 1.482                         | 16.382     | 0.15796         |
| ABBV   | AbbVie Inc.   | 153.311                               | 5.42                         | 5.29                          | 7.95  | 5.711                         | 13.661     | 0.10653         |
| ACN    | Accenture plc   | 141.907                               | 1.56                         | 1.46                          | 9.51  | 1.599                         | 11.109     | 0.08019         |
| AAP    | Advance Auto Parts  | 10.73                                 | 0.65                         | 0.4                           | 11.9  | 0.448                         | 12.348     | 0.00674         |
| AES    | AES Corp  | 12.235                                | 3.2                          | 3.12                          | 7.65  | 3.359                         | 11.009     | 0.00685         |
| AFL    | AFLAC Inc   | 26.321                                | 3.08                         | 3.02                          | 1.6   | 3.068                         | 4.668      | 0.00625         |
| A      | Agilent Technologies Inc                                    | 31.102                                | 0.71                         | 0.7                           | 9.4   | 0.766                         | 10.166     | 0.01608         |
| APD    | Air Products & Chemicals Inc                                | 65.599                                | 1.82                         | 1.7                           | 10.33   | 1.876                         | 12.206     | 0.04073         |
| ALB    | Albemarle Corp  | 9.556                                 | 1.78                         | 1.74                          | 15  | 2.001                         | 17.001     | 0.00826         |
| ARE    | Alexandria Real Estate<br>Equities                          | 20.809                                | 2.6                          | 2.52                          | 0.1   | 2.523                         | 2.623      | 0.00278         |
| LNT    | Alliant Energy Corp   | 13.296                                | 2.9                          | 2.81                          | 5.3   | 2.959                         | 8.259      | 0.00559         |
| ALL    | Allstate Corp   | 29.208                                | 2.34                         | 2.25                          | 6.35  | 2.393                         | 8.743      | 0.01299         |
| MO     | Altria Group Inc  | 72.673                                | 8.9                          | 8.63                          | 6.1   | 9.156                         | 15.256     | 0.05640         |
| AMCR   | Arcor plc   | 17.371                                | 4.16                         | 4.27                          | 5.44  | 4.502                         | 9.942      | 0.00879         |
| AEE    | Ameren Corp   | 19.838                                | 2.48                         | 2.45                          | 6   | 2.597                         | 8.597      | 0.00868         |
| AEP    | American Electric Power                                     | 42.253                                | 3.37                         | 3.33                          | 5.63  | 3.517                         | 9.147      | 0.01966         |
| AXP    | American Express Co   | 82.134                                | 1.7                          | 1.7                           | 9.35  | 1.859                         | 11.209     | 0.04683         |
| AMT    | American Tower Corp.<br>American Water Works<br>Company Inc | 108.027                               | 1.79                         | 1.71                          | 14.87   | 1.964                         | 16.834     | 0.09250         |
| AWK    | Ameriprise Financial  | 27.137                                | 1.48                         | 1.38                          | 8.3   | 1.495                         | 9.795      | 0.01352         |
| AMP    | AmerisourceBergen Corp                                      | 19.226                                | 2.68                         | 2.54                          | 7.77  | 2.737                         | 10.507     | 0.01028         |
| ABC    | Amgen Inc.  | 19.557                                | 1.76                         | 1.72                          | 8.17  | 1.861                         | 10.031     | 0.00998         |
| AMGN   | Amphenol Corp   | 145.112                               | 2.51                         | 2.39                          | 6.87  | 2.554                         | 9.424      | 0.06956         |
| APH    | Analog Devices, Inc.  | 32.829                                | 0.91                         | 0.91                          | 3   | 0.937                         | 3.937      | 0.00657         |
| ADI    | Anthem  | 42.409                                | 2.08                         | 2.02                          | 8.44  | 2.190                         | 10.630     | 0.02293         |
| ANTM   | Aon plc   | 69.245                                | 1.41                         | 1.3                           | 14.52   | 1.489                         | 16.009     | 0.05639         |
| AON    |   | 45.579                                | 0.85                         | 0.85                          | 6.77  | 0.908                         | 7.678      | 0.01780         |



|      |                                   |         |      |      |       |       |        |         |
|------|-----------------------------------|---------|------|------|-------|-------|--------|---------|
| AOS  | A.O. Smith Corp                   | 8.644   | 1.79 | 1.75 | 8     | 1.890 | 9.890  | 0.00435 |
| AIV  | Apartment Investment & Management | 5.396   | 4.66 | 4.6  | 7.1   | 4.927 | 12.027 | 0.00330 |
| AAPL | Apple Inc.                        | 1933    | 0.7  | 0.67 | 12.46 | 0.753 | 13.213 | 1.29922 |
| APTV | Aptiv PLC                         | 25.264  |      | 0.7  | 4.56  | 0.732 | 5.292  | 0.00680 |
| AJG  | Arthur J. Gallagher & Co.         | 20.336  | 1.7  | 1.67 | 11.52 | 1.862 | 13.382 | 0.01384 |
| AIZ  | Assurant                          | 7.362   | 2.06 | 2.03 | 19.4  | 2.424 | 21.824 | 0.00817 |
| T    | AT&T Inc.                         | 204.345 | 7.3  | 7.27 | 0.29  | 7.291 | 7.581  | 0.07880 |
| ATO  | Atmos Energy                      | 11.845  | 2.41 | 2.36 | 7.25  | 2.531 | 9.781  | 0.00589 |
| ADP  | Automatic Data Processing         | 59.607  | 2.64 | 2.56 | 10.57 | 2.831 | 13.401 | 0.04063 |
| AVB  | AvalonBay Communities             | 22.242  | 4.09 | 4    | 2.54  | 4.102 | 6.642  | 0.00751 |
| AVY  | Avery Dennison Corp               | 10.378  | 1.86 | 1.86 | 7.84  | 2.006 | 9.846  | 0.00520 |
| BKR  | Baker Hughes Co                   | 13.072  | 5.42 |      | 2.47  | 5.420 | 7.890  | 0.00525 |
| BLL  | Ball Corp                         | 27.004  | 0.73 | 0.73 | 10.45 | 0.806 | 11.256 | 0.01546 |
| BAC  | Bank of America Corp              | 94.867  |      | 3.67 | 12.33 | 4.123 | 16.453 | 0.07939 |
| BK   | The Bank of New York Mellon       | 30.766  | 3.63 | 3.63 | 2.8   | 3.732 | 6.532  | 0.01022 |
| BAX  | Baxter International Inc.         | 94.867  |      | 3.67 | 12.33 | 4.123 | 16.453 | 0.07939 |
| BDX  | Becton Dickinson                  | 67.45   | 1.37 | 1.36 | 6.4   | 1.447 | 7.847  | 0.02692 |
| BBY  | Best Buy Co. Inc.                 | 29.098  | 1.93 | 1.88 | 7.4   | 2.019 | 9.419  | 0.01394 |
| BLK  | BlackRock                         | 86.934  | 2.56 | 2.44 | 7.73  | 2.629 | 10.359 | 0.04581 |
| BA   | Boeing Company                    | 94.873  |      | 3.67 | 12.33 | 4.123 | 16.453 | 0.07940 |
| BWA  | BorgWarner                        | 8.124   | 1.72 | 1.72 | 1.79  | 1.751 | 3.541  | 0.00146 |
| BXP  | Boston Properties                 | 13.271  | 4.73 | 4.7  | 7     | 5.029 | 12.029 | 0.00812 |
| AVGO | Broadcom Inc.                     | 144.338 | 3.53 | 3.53 | 7.9   | 3.809 | 11.709 | 0.08597 |
| BR   | Broadridge Financial Solutions    | 15.364  | 1.72 | 1.61 | 10    | 1.771 | 11.771 | 0.00920 |
| BF.B | Brown-Forman Corp.                | 35.069  | 0.92 | 0.91 | 6.85  | 0.972 | 7.822  | 0.01395 |
| CHRW | C. H. Robinson Worldwide          | 13.6    | 2.02 | 2.01 | 3.79  | 2.086 | 5.876  | 0.00407 |
| CPB  | Campbell Soup                     | 14.75   | 2.89 | 2.89 | 8.64  | 3.140 | 11.780 | 0.00884 |
| COF  | Capital One Financial             | 34.22   | 0.55 | 2.19 | 8     | 2.365 | 10.365 | 0.01804 |
| CAH  | Cardinal Health Inc.              | 13.584  | 4.22 | 4.19 | 4.66  | 4.385 | 9.045  | 0.00625 |
| CBOE | Cboe Global Markets               | 9.515   | 1.9  | 1.22 | 2.6   | 1.252 | 3.852  | 0.00186 |
| CDW  | CDW                               | 18.46   | 1.23 | 1.16 | 9.1   | 1.266 | 10.366 | 0.00973 |

|       |                                  |         |      |      |       |       |        |         |
|-------|----------------------------------|---------|------|------|-------|-------|--------|---------|
| CE    | Celanese                         | 12.805  | 2.34 | 2.34 | 1.7   | 2.380 | 4.080  | 0.00266 |
| CERN  | Cerner                           | 21.737  | 1    | 1    | 10.5  | 1.105 | 11.605 | 0.01283 |
| CMG   | Chipotle Mexican Grill           | 33.278  | 5.85 | 5.35 | 3.48  | 5.536 | 9.016  | 0.01526 |
| CB    | Chubb Limited                    | 52.611  | 2.69 | 2.61 | 1.79  | 2.657 | 4.447  | 0.01190 |
| CHD   | Church & Dwight                  | 22.547  | 1.03 | 1.01 | 9.48  | 1.106 | 10.586 | 0.01214 |
| CI    | CIGNA Corp.                      | 62.408  | 0.02 | 0.02 | 10.94 | 0.022 | 10.962 | 0.03480 |
| CTAS  | Cintas Corporation               | 35.364  | 0.75 | 0.75 | 11.95 | 0.840 | 12.790 | 0.02301 |
| CSCO  | Cisco Systems                    | 162.013 | 3.71 | 3.66 | 6.18  | 3.886 | 10.066 | 0.08296 |
| CTXS  | Citrix Systems                   | 16.719  | 1.01 | 1.04 | 9.37  | 1.137 | 10.507 | 0.00894 |
| CLX   | The Clorox Company               | 26.377  | 2.12 | 2.05 | 4.57  | 2.144 | 6.714  | 0.00901 |
| CME   | CME Group Inc.                   | 60.023  | 2.02 | 1.9  | 4.21  | 1.980 | 6.190  | 0.01890 |
| CMS   | CMS Energy                       | 17.56   | 2.64 | 2.56 | 7.08  | 2.741 | 9.821  | 0.00877 |
| KO    | Coca-Cola Company                | 211.529 | 3.32 | 3.28 | 2.93  | 3.376 | 6.306  | 0.06785 |
| CTSH  | Cognizant Technology Solutions   | 38.518  | 1.27 | 1.22 | 2.82  | 1.254 | 4.074  | 0.00798 |
| CL    | Colgate-Palmolive                | 66.87   | 2.27 | 2.24 | 5.91  | 2.372 | 8.282  | 0.02817 |
| CMCSA | Comcast Corp.                    | 212.099 | 2.04 | 1.95 | 5.24  | 2.052 | 7.292  | 0.07867 |
| CAG   | Conagra Brands                   | 18.059  | 2.98 | 2.3  | 7.14  | 2.464 | 9.604  | 0.00882 |
| ED    | Consolidated Edison              | 26.802  | 3.84 | 3.77 | 2.55  | 3.866 | 6.416  | 0.00875 |
| STZ   | Constellation Brands             | 35.602  | 1.62 | 1.62 | 7.92  | 1.748 | 9.668  | 0.01751 |
| COO   | The Cooper Companies             | 18.242  | 0.02 | 0.02 | 10    | 0.022 | 10.022 | 0.00930 |
| GLW   | Corning Inc.                     | 25.561  | 2.68 | 2.56 | 1.3   | 2.593 | 3.893  | 0.00506 |
| CTVA  | Corteva                          | 22.5966 | 1.77 | 0.89 | 5.31  | 0.937 | 6.247  | 0.00718 |
| COST  | Costco Wholesale Corp.           | 157.243 | 0.79 | 0.76 | 7.04  | 0.814 | 7.854  | 0.06282 |
| CCI   | Crown Castle International Corp. | 70.372  | 2.85 | 2.8  | 18.94 | 3.330 | 22.270 | 0.07972 |
| CSX   | CSX Corp.                        | 59.33   | 1.35 | 1.3  | 3.81  | 1.350 | 5.160  | 0.01557 |
| CVS   | CVS Health                       | 76.847  | 3.46 | 3.46 | 6.34  | 3.679 | 10.019 | 0.03917 |
| DHI   | D. R. Horton                     | 27.51   | 0.9  | 0.87 | 18.6  | 1.032 | 19.632 | 0.02747 |
| DHR   | Danaher Corp.                    | 154.19  | 0.34 | 0.33 | 13.02 | 0.373 | 13.393 | 0.10504 |
| DE    | Deere & Co.                      | 70.68   | 1.35 | 1.35 | 8.46  | 1.464 | 9.924  | 0.03568 |
| XRAY  | Dentsply Sirona                  | 9.745   | 0.92 | 0.92 | 4.27  | 0.959 | 5.229  | 0.00259 |
| FANG  | Diamondback Energy               | 4.905   | 5.16 | 4.31 | 13.45 | 4.890 | 18.340 | 0.00458 |

|      |  |        |       |       |       |        |        |         |
|------|--|--------|-------|-------|-------|--------|--------|---------|
| DLR  | Digital Realty Trust Inc               | 42.153 | 3     | 2.95  | 16.66 | 3.441  | 20.101 | 0.04310 |
| DFS  | Discover Financial Services            | 19.344 | 2.89  | 2.89  | 0.7   | 2.910  | 3.610  | 0.00355 |
| DG   | Dollar General                         | 52.957 | 0.68  | 0.64  | 14.79 | 0.735  | 15.525 | 0.04182 |
| D    | Dominion Energy                        | 67.61  | 4.71  | 4.66  | 2.74  | 4.788  | 7.528  | 0.02589 |
| DPZ  | Domino's Pizza                         | 16.717 | 0.72  | 0.66  | 15.28 | 0.761  | 16.041 | 0.01364 |
| DOV  | Dover Corporation                      | 15.961 | 1.8   | 1.78  | 1.24  | 1.802  | 3.042  | 0.00247 |
| DTE  | DTE Energy Co.                         | 22.035 | 3.55  | 3.49  | 5.95  | 3.698  | 9.648  | 0.01081 |
| DUK  | Duke Energy                            | 67.432 | 4.21  | 4.13  | 1.6   | 4.196  | 5.796  | 0.01988 |
| DRE  | Duke Realty Corp                       | 14.496 | 2.45  | 2.45  | 6     | 2.597  | 8.597  | 0.00634 |
| DD   | DuPont de Nemours Inc                  | 41.16  | 2.2   | 2.19  | 1.62  | 2.225  | 3.845  | 0.00805 |
| EMN  | Eastman Chemical                       | 10.919 | 3.38  | 3.33  | 3.31  | 3.440  | 6.750  | 0.00375 |
| EBAY | eBay Inc.                              | 36.198 | 1.22  | 1.16  | 15.92 | 1.345  | 17.265 | 0.03179 |
| ECL  | Ecolab Inc.                            | 56.874 | 0.95  | 0.94  | 8.11  | 1.016  | 9.126  | 0.02640 |
| EIX  | Edison Int'l                           | 19.906 | 4.95  | 4.9   | 1.4   | 4.969  | 6.369  | 0.00645 |
| EMR  | Emerson Electric Company               | 40.331 | 3.05  | 3.04  | 0.99  | 3.070  | 4.060  | 0.00833 |
| ETR  | Entergy Corp.                          | 21.493 | 3.59  | 3.57  | 5.4   | 3.763  | 9.163  | 0.01002 |
| EFX  | Equifax Inc.                           | 19.36  | 0.989 | 0.98  | 6.43  | 1.043  | 7.473  | 0.00736 |
| EQIX | Equinix                                | 69.476 | 1.37  | 1.32  | 15.7  | 1.527  | 17.227 | 0.06088 |
| EQR  | Equity Residential                     | 20.669 | 4.37  | 4.25  | 6.1   | 4.509  | 10.609 | 0.01115 |
| ESS  | Essex Property Trust, Inc.             | 13.902 | 3.92  | 3.8   | 7.9   | 4.100  | 12.000 | 0.00849 |
| EL   | Estée Lauder Companies                 | 80.202 | 0.88  | 0.64  | 13.31 | 0.725  | 14.035 | 0.05726 |
| EVRG | Evergy                                 | 11.916 | 3.89  | 3.83  | 6.8   | 4.090  | 10.890 | 0.00660 |
| ES   | Eversource Energy                      | 30.723 | 2.61  | 2.53  | 6.44  | 2.693  | 9.133  | 0.01427 |
| RE   | Everest Re Group Ltd.                  | 8.106  | 3.12  | 3.05  | 4.73  | 3.194  | 7.924  | 0.00327 |
| EXPD | Expeditors                             | 15.26  | 1.16  | 1.14  | 6.59  | 1.215  | 7.805  | 0.00606 |
| EXR  | Extra Space Storage                    | 14.605 | 3.2   | 3.2   | 6     | 3.392  | 9.392  | 0.00698 |
| XOM  | Exxon Mobil Corp.                      | 142.09 | 10.55 | 10.55 | 2.36  | 10.799 | 13.159 | 0.09511 |
| FAST | Fastenal Co                            | 26.286 | 2.25  | 2.11  | 9.1   | 2.302  | 11.402 | 0.01525 |
| FRT  | Federal Realty Investment Trust        | 5.925  | 5.41  | 5.36  | 6.7   | 5.719  | 12.419 | 0.00374 |
| FDX  | FedEx Corporation                      | 68.143 | 1.02  | 1.02  | 16.11 | 1.184  | 17.294 | 0.05995 |
| FIS  | Fidelity National Information Services | 89.988 | 0.85  | 0.96  | 12.56 | 1.081  | 13.641 | 0.06244 |

|      |                                |         |      |      |       |       |        |         |
|------|--------------------------------|---------|------|------|-------|-------|--------|---------|
| FRC  | First Republic Bank            | 20.131  | 0.71 | 0.69 | 7.21  | 0.740 | 7.950  | 0.00814 |
| FLIR | FLIR Systems                   | 4.774   | 1.92 | 1.92 | 6     | 2.035 | 8.035  | 0.00195 |
| FLS  | Flowserve Corporation          | 3.635   | 2.94 | 2.86 | 2.45  | 2.930 | 5.380  | 0.00099 |
| FMC  | FMC Corporation                | 13.693  | 1.7  | 1.66 | 9.54  | 1.818 | 11.358 | 0.00791 |
| FTV  | Fortive Corp                   | 26.955  | 0.37 | 0.36 | 5.14  | 0.379 | 5.519  | 0.00757 |
| FBHS | Fortune Brands Home & Security | 12.216  | 1.1  | 1.05 | 7.3   | 1.127 | 8.427  | 0.00524 |
| FOXA | Fox Corporation (Class A)      | 17.23   | 1.63 | 1.63 | 9.2   | 1.780 | 10.980 | 0.00962 |
| GRMN | Garmin Ltd.                    | 18.436  | 2.57 | 2.57 | 4.32  | 2.681 | 7.001  | 0.00657 |
| GD   | General Dynamics               | 40.945  |      | 3.02 | 3.88  | 3.137 | 7.017  | 0.01461 |
| GIS  | General Mills                  | 38.288  | 3.26 | 3.13 | 5.05  | 3.288 | 8.338  | 0.01624 |
| GM   | General Motors                 | 44.314  |      | 3.74 | 1.88  | 3.810 | 5.690  | 0.01283 |
| GILD | Gilead Sciences                | 79.737  | 4.38 | 4.21 | 0.24  | 4.220 | 4.460  | 0.01809 |
| GL   | Globe Life Inc.                | 8.748   | 0.93 | 0.85 | 5.1   | 0.893 | 5.993  | 0.00267 |
| GPN  | Global Payments Inc.           | 52.786  | 0.44 | 0.44 | 17.05 | 0.515 | 17.565 | 0.04716 |
| GS   | Goldman Sachs Group            | 69.4    | 2.5  | 2.5  | 6.6   | 2.665 | 9.265  | 0.03271 |
| GWV  | Grainger (W.W.) Inc.           | 19.89   | 1.7  | 1.6  | 5.6   | 1.690 | 7.290  | 0.00738 |
| HBI  | Hanesbrands Inc                | 5.832   | 3.72 | 3.72 | 0.7   | 3.746 | 4.446  | 0.00132 |
| HCA  | HCA Healthcare                 | 44.012  |      | 0.97 | 10.77 | 1.074 | 11.844 | 0.02652 |
| PEAK | Healthpeak Properties          | 15.234  | 5.19 |      | 2.5   | 5.190 | 7.690  | 0.00596 |
| HSY  | The Hershey Company            | 29.903  | 2.25 | 2.16 | 6.78  | 2.306 | 9.086  | 0.01382 |
| HD   | Home Depot                     | 317.715 | 2.15 | 2.1  | 5.95  | 2.225 | 8.175  | 0.13212 |
| HON  | Honeywell Int'l Inc.           | 118.433 | 2.25 | 2.13 | 2.44  | 2.182 | 4.622  | 0.02784 |
| HRL  | Hormel Foods Corp.             | 26.716  | 1.9  | 1.85 | 3     | 1.906 | 4.906  | 0.00667 |
| HPQ  | HP Inc.                        | 26.536  | 3.69 | 3.61 | 9.34  | 3.947 | 13.287 | 0.01794 |
| HUM  | Humana Inc.                    | 55.541  | 0.61 | 0.58 | 12.45 | 0.652 | 13.102 | 0.03702 |
| HII  | Huntington Ingalls Industries  | 5.925   | 2.86 | 2.74 | 2.3   | 2.803 | 5.103  | 0.00154 |
| IEX  | IDEX Corporation               | 13.818  | 1.11 | 1.11 | 13    | 1.254 | 14.254 | 0.01002 |
| INFO | IHS Markit Ltd.                | 31.287  | 0.87 | 0.65 | 13.6  | 0.738 | 14.338 | 0.02282 |
| ITW  | Illinois Tool Works            | 62.578  | 2.38 | 2.23 | 0.41  | 2.239 | 2.649  | 0.00843 |
| IR   | Ingersoll Rand                 | 15.394  |      | 5.88 | 0.2   | 5.892 | 6.092  | 0.00477 |
| INTC | Intel Corp.                    | 219.838 | 2.59 | 2.53 | 8.62  | 2.748 | 11.368 | 0.12712 |
| ICE  | Intercontinental Exchange      | 57.141  | 1.18 | 1.13 | 9.2   | 1.234 | 10.434 | 0.03033 |

|      |                               |         |      |      |       |       |        |         |
|------|-------------------------------|---------|------|------|-------|-------|--------|---------|
|      | International Business        |         |      |      |       |       |        |         |
| IBM  | Machines                      | 108.66  | 5.41 | 5.38 | 2.57  | 5.518 | 8.088  | 0.04471 |
| IPG  | Interpublic Group             | 6.87    | 5.86 | 5.63 | 1.1   | 5.692 | 6.792  | 0.00237 |
|      | International Flavors &       |         |      |      |       |       |        |         |
| IFF  | Fragrances                    | 12.657  | 2.58 | 2.52 | 0.38  | 2.530 | 2.910  | 0.00187 |
| INTU | Intuit Inc.                   | 86.752  | 0.73 | 0.66 | 9.09  | 0.720 | 9.810  | 0.04329 |
| IRM  | Iron Mountain Incorporated    | 7.881   | 9.05 | 9.02 | 8     | 9.742 | 17.742 | 0.00711 |
| JKHY | Jack Henry & Associates       | 12.422  | 1.06 | 1.03 | 7     | 1.102 | 8.102  | 0.00512 |
| J    | Jacobs Engineering Group      | 12.548  | 0.81 |      | 10.46 | 0.810 | 11.270 | 0.00719 |
| JBHT | J. B. Hunt Transport Services | 13.774  | 0.85 | 0.83 | 10.09 | 0.914 | 11.004 | 0.00771 |
| SJM  | JM Smucker                    | 13.39   | 3.09 | 3.04 | 0.68  | 3.061 | 3.741  | 0.00255 |
| JNJ  | Johnson & Johnson             | 390.263 | 2.76 | 2.64 | 5.09  | 2.774 | 7.864  | 0.15612 |
|      | Johnson Controls              |         |      |      |       |       |        |         |
| JCI  | International                 | 31.362  | 2.5  | 2.5  | 12.94 | 2.824 | 15.764 | 0.02515 |
| JNPR | Juniper Networks              | 7.285   | 3.75 | 3.66 | 1.8   | 3.726 | 5.526  | 0.00205 |
| KSU  | Kansas City Southern          | 17.093  | 0.88 | 0.86 | 9.67  | 0.943 | 10.613 | 0.00923 |
| K    | Kellogg Co.                   | 22.444  | 3.52 | 3.52 | 1.75  | 3.582 | 5.332  | 0.00609 |
| KMB  | Kimberly-Clark                | 50.997  | 2.9  | 2.85 | 6.36  | 3.031 | 9.391  | 0.02436 |
| KIM  | Kimco Realty                  | 5.168   |      | 7.06 | 4.6   | 7.385 | 11.985 | 0.00315 |
| KLAC | KLA Corporation               | 31.01   | 1.88 | 1.72 | 9.28  | 1.880 | 11.160 | 0.01760 |
| KR   | Kroger Co.                    | 26.737  | 2.11 | 1.94 | 7.98  | 2.095 | 10.075 | 0.01370 |
| LB   | L Brands Inc.                 | 9.229   |      | 2.72 | 7.1   | 2.913 | 10.013 | 0.00470 |
| LHX  | L3Harris Technologies         | 37.704  | 1.96 | 1.73 | 13.4  | 1.962 | 15.362 | 0.02946 |
| LRCX | Lam Research                  | 49.837  | 1.58 | 1.4  | 16.17 | 1.626 | 17.796 | 0.04511 |
| LW   | Lamb Weston Holdings Inc      | 10.107  | 1.38 | 1.27 | 7     | 1.359 | 8.359  | 0.00430 |
| LEG  | Leggett & Platt               | 5.745   | 3.75 | 3.75 | 5.2   | 3.945 | 9.145  | 0.00267 |
| LDOS | Leidos Holdings               | 12.772  | 1.5  | 1.5  | 11.43 | 1.671 | 13.101 | 0.00851 |
| LEN  | Lennar Corp.                  | 25.356  | 1.19 | 0.49 | 11.4  | 0.546 | 11.946 | 0.01541 |
| LLY  | Lilly (Eli) & Co.             | 140.247 | 2.04 | 1.91 | 13.14 | 2.161 | 15.301 | 0.10916 |
| LNC  | Lincoln National              | 6.626   | 4.9  | 4.81 | 9.88  | 5.285 | 15.165 | 0.00511 |
| LIN  | Linde plc                     | 123.507 | 1.66 | 1.58 | 10.83 | 1.751 | 12.581 | 0.07904 |
| LMT  | Lockheed Martin Corp.         | 107.333 | 2.73 | 2.47 | 9.11  | 2.695 | 11.805 | 0.06445 |
| L    | Loews Corp.                   | 9.968   | 0.7  | 0.7  | 14.03 | 0.798 | 14.828 | 0.00752 |

|      |                               |         |      |      |       |       |        |         |
|------|-------------------------------|---------|------|------|-------|-------|--------|---------|
| MKTX | MarketAxess                   | 18.88   | 0.5  | 0.46 | 17.53 | 0.541 | 18.071 | 0.01735 |
| MMC  | Marsh & McLennan              | 58.585  | 1.62 | 1.6  | 4.87  | 1.678 | 6.548  | 0.01951 |
| MLM  | Martin Marietta Materials     | 15.516  | 0.95 | 0.91 | 4.97  | 0.955 | 5.925  | 0.00468 |
| MAS  | Masco Corp.                   | 14.601  | 1.01 | 0.98 | 14.34 | 1.121 | 15.461 | 0.01148 |
| MA   | Mastercard Inc.               | 343.614 | 0.47 | 0.45 | 11.25 | 0.501 | 11.751 | 0.20538 |
| MKC  | McCormick & Co.               | 26.001  | 1.29 | 1.26 | 4.8   | 1.320 | 6.120  | 0.00809 |
| MXIM | Maxim Integrated Products Inc | 18.25   |      | 2.89 | 6.02  | 3.064 | 9.084  | 0.00843 |
| MCD  | McDonald's Corp.              | 168.219 | 2.25 | 2.21 | 3.88  | 2.296 | 6.176  | 0.05284 |
| MCK  | McKesson Corp.                | 24.196  | 1.14 | 1.12 | 8.07  | 1.210 | 9.280  | 0.01142 |
| MDT  | Medtronic plc                 | 139.409 | 2.28 | 2.16 | 9.41  | 2.363 | 11.773 | 0.08349 |
| MRK  | Merck & Co.                   | 205.475 | 3.02 | 2.87 | 6.25  | 3.049 | 9.299  | 0.09720 |
| MET  | MetLife Inc.                  | 34.963  | 4.89 | 4.73 | 2.89  | 4.867 | 7.757  | 0.01379 |
| MCHP | Microchip Technology          | 27.091  | 1.42 | 1.41 | 7     | 1.509 | 8.509  | 0.01173 |
| MSFT | Microsoft Corp.               | 1592    | 1.09 | 0.99 | 15.25 | 1.141 | 16.391 | 1.32734 |
| MAA  | Mid-America Apartments        | 14.238  | 3.23 | 3.17 | 7     | 3.392 | 10.392 | 0.00753 |
| MDLZ | Mondelez International        | 81.53   | 2.22 | 2    | 6.35  | 2.127 | 8.477  | 0.03516 |
| MCO  | Moody's Corp                  | 55.405  | 0.76 | 0.72 | 8.62  | 0.782 | 9.402  | 0.02650 |
| MS   | Morgan Stanley                | 76.631  | 2.92 | 2.92 | 2.78  | 3.001 | 5.781  | 0.02253 |
| MOS  | The Mosaic Company            | 7.309   | 1.09 | 1.09 | 7     | 1.166 | 8.166  | 0.00304 |
| MSI  | Motorola Solutions Inc.       | 26.743  | 1.63 | 1.59 | 10.32 | 1.754 | 12.074 | 0.01642 |
| MSCI | MSCI Inc                      | 29.383  | 0.9  | 0.78 | 13.1  | 0.882 | 13.982 | 0.02090 |
| NDAQ | Nasdaq, Inc.                  | 20.511  | 1.59 | 1.54 | 8.88  | 1.677 | 10.557 | 0.01101 |
| NTAP | NetApp                        | 9.624   | 4.49 | 4.49 | 3.9   | 4.665 | 8.565  | 0.00419 |
| NEE  | NextEra Energy                | 140.975 | 1.99 | 1.88 | 8.14  | 2.033 | 10.173 | 0.07295 |
| NI   | NiSource Inc.                 | 8.423   | 3.79 | 3.75 | 1.81  | 3.818 | 5.628  | 0.00241 |
| NBL  | Noble Energy                  | 4.1     | 3.31 | 4.49 | 5     | 4.715 | 9.715  | 0.00203 |
| NSC  | Norfolk Southern Corp.        | 54.889  | 1.77 | 1.77 | 5.52  | 1.868 | 7.388  | 0.02063 |
| NOC  | Northrop Grumman              | 52.045  | 1.85 | 1.72 | 12.3  | 1.932 | 14.232 | 0.03768 |
| NLOK | NortonLifeLock                | 12.718  | 2.43 |      | 5     | 2.430 | 7.430  | 0.00481 |
| NVDA | Nvidia Corporation            | 337.087 | 0.12 | 0.12 | 17.44 | 0.141 | 17.581 | 0.30145 |
| ODFL | Old Dominion Freight Line     | 22.112  | 0.33 | 0.28 | 10.07 | 0.308 | 10.378 | 0.01167 |
| OMC  | Omnicom Group                 | 11.109  | 5.07 | 5.07 | 1.4   | 5.141 | 6.541  | 0.00370 |

|      |   |         |      |      |       |       |        |         |
|------|---|---------|------|------|-------|-------|--------|---------|
| ORCL | Oracle Corp.                              | 179.329 | 1.63 | 1.63 | 9.18  | 1.780 | 10.960 | 0.09997 |
| OTIS | Otis Worldwide                            | 27.951  | 1.27 |      | 4.7   | 1.270 | 5.970  | 0.00849 |
| PH   | Parker-Hannifin                           | 27.452  | 1.7  | 1.7  | 7.49  | 1.827 | 9.317  | 0.01301 |
| PAYX | Paychex Inc.                              | 29.32   | 3.12 | 3.12 | 3.28  | 3.222 | 6.502  | 0.00970 |
| PNR  | Pentair plc                               | 7.663   | 1.66 | 1.61 | 3.9   | 1.673 | 5.573  | 0.00217 |
| PBCT | People's United Financial                 | 4.575   | 6.84 | 6.77 | 13.73 | 7.700 | 21.430 | 0.00499 |
| PEP  | PepsiCo Inc.                              | 190.614 | 2.96 | 2.86 | 5.9   | 3.029 | 8.929  | 0.08657 |
| PKI  | PerkinElmer                               | 14.504  | 0.22 | 0.22 | 16.95 | 0.257 | 17.207 | 0.01270 |
| PRGO | Perrigo                                   | 6.183   | 2.01 | 1.94 | 10    | 2.134 | 12.134 | 0.00382 |
| PFE  | Pfizer Inc.                               | 204.215 | 4.18 | 4.07 | 5.37  | 4.289 | 9.659  | 0.10033 |
| PM   | Philip Morris International               | 118.214 | 6.45 | 6.29 | 5.26  | 6.621 | 11.881 | 0.07144 |
| PXD  | Pioneer Natural Resources                 | 14.673  | 2.54 | 2.29 | 11.18 | 2.546 | 13.726 | 0.01024 |
| PPG  | PPG Industries                            | 29.714  | 1.75 | 1.65 | 4.66  | 1.727 | 6.387  | 0.00965 |
| PFG  | Principal Financial Group                 | 11.497  | 5.46 | 5.41 | 6.09  | 5.739 | 11.829 | 0.00692 |
| PG   | Procter & Gamble                          | 347.028 | 2.29 | 2.19 | 7.15  | 2.347 | 9.497  | 0.16764 |
| PGR  | Progressive Corp.                         | 56.206  | 0.42 | 2.81 | 0.94  | 2.836 | 3.776  | 0.01080 |
| PRU  | Prudential Financial                      | 25.955  | 6.89 | 6.57 | 3.77  | 6.818 | 10.588 | 0.01398 |
| PEG  | Public Service Enterprise<br>Group (PSEG) | 28.48   | 3.5  | 3.43 | 1.47  | 3.480 | 4.950  | 0.00717 |
| PSA  | Public Storage                            | 40.582  | 3.47 | 3.47 | 17    | 4.060 | 21.060 | 0.04347 |
| PHM  | PulteGroup                                | 12.797  | 1.01 | 0.97 | 2     | 0.989 | 2.989  | 0.00195 |
| PWR  | Quanta Services Inc.                      | 7.904   | 0.37 | 0.34 | 10.02 | 0.374 | 10.394 | 0.00418 |
| DGX  | Quest Diagnostics                         | 15.497  | 1.97 | 1.92 | 11.7  | 2.145 | 13.845 | 0.01091 |
| RL   | Ralph Lauren Corporation                  | 5.245   |      | 2.95 | 1.65  | 2.999 | 4.649  | 0.00124 |
| O    | Realty Income Corporation                 | 21.824  | 4.4  | 4.32 | 5.45  | 4.555 | 10.005 | 0.01111 |
| REG  | Regency Centers Corporation               | 6.805   | 5.92 | 5.87 | 9.1   | 6.404 | 15.504 | 0.00537 |
| RSG  | Republic Services Inc                     | 29.789  | 1.82 | 1.74 | 7.11  | 1.864 | 8.974  | 0.01360 |
| RHI  | Robert Half International                 | 6.374   | 2.49 | 2.38 | 2.7   | 2.444 | 5.144  | 0.00167 |
| ROK  | Rockwell Automation Inc.                  | 27.046  | 1.83 | 1.8  | 1.72  | 1.831 | 3.551  | 0.00489 |
| ROL  | Rollins Inc.                              | 18.25   | 0.59 | 0.75 | 8.2   | 0.812 | 9.012  | 0.00837 |
| ROP  | Roper Technologies                        | 42.01   | 0.52 | 0.51 | 1     | 0.515 | 1.515  | 0.00324 |
| ROST | Ross Stores                               | 34.561  |      | 0.56 | 2.6   | 0.575 | 3.175  | 0.00558 |
| SPGI | S&P Global, Inc.                          | 87.958  | 0.74 | 0.68 | 9.89  | 0.747 | 10.637 | 0.04759 |

|      |                              |         |      |       |       |        |        |         |
|------|------------------------------|---------|------|-------|-------|--------|--------|---------|
| STX  | Seagate Technology           | 12.599  | 5.33 | 5.29  | 7.85  | 5.705  | 13.555 | 0.00869 |
| SEE  | Sealed Air                   | 6.389   | 1.59 | 1.59  | 6.45  | 1.693  | 8.143  | 0.00265 |
| SRE  | Sempra Energy                | 35.223  | 3.47 | 3.34  | 6.27  | 3.549  | 9.819  | 0.01759 |
| SHW  | Sherwin-Williams             | 62.788  | 0.78 | 0.72  | 9.51  | 0.788  | 10.298 | 0.03289 |
| SPG  | Simon Property Group Inc     | 21.033  | 7.62 | 11.14 | 8.6   | 12.098 | 20.698 | 0.02214 |
| SWKS | Skyworks Solutions           | 25.326  | 1.36 | 1.2   | 12.65 | 1.352  | 14.002 | 0.01804 |
| SNA  | Snap-on                      | 8.259   | 2.92 | 2.83  | 10    | 3.113  | 13.113 | 0.00551 |
| SO   | Southern Company             | 60.379  | 4.55 | 4.44  | 4.55  | 4.642  | 9.192  | 0.02823 |
| SWK  | Stanley Black & Decker       | 27.036  | 1.7  | 1.67  | 3.66  | 1.731  | 5.391  | 0.00741 |
| SBUX | Starbucks Corp.              | 103.421 | 2.03 | 1.89  | 2.71  | 1.941  | 4.651  | 0.02447 |
| STT  | State Street Corp.           | 21.633  | 3.49 | 3.49  | 1.74  | 3.551  | 5.291  | 0.00582 |
| STE  | STERIS plc                   | 14.86   | 0.93 | 0.86  | 10    | 0.946  | 10.946 | 0.00827 |
| SYK  | Stryker Corp.                | 80.402  | 1.1  | 1.08  | 7.86  | 1.165  | 9.025  | 0.03691 |
| TROW | T. Rowe Price Group          | 30.305  | 2.79 | 2.57  | 7.97  | 2.775  | 10.745 | 0.01656 |
| TPR  | Tapestry, Inc.               | 4.707   |      | 6.27  | 7     | 6.709  | 13.709 | 0.00328 |
| TGT  | Target Corp.                 | 80.845  | 1.71 | 1.66  | 7.07  | 1.777  | 8.847  | 0.03638 |
| TEL  | TE Connectivity Ltd.         | 33.456  | 1.95 | 1.89  | 11    | 2.098  | 13.098 | 0.02229 |
| FTI  | TechnipFMC                   | 3.008   | 2.07 | 4.08  | 1.8   | 4.153  | 5.953  | 0.00091 |
| TFX  | Teleflex                     | 15.7873 | 0.4  | 0.4   | 13    | 0.452  | 13.452 | 0.01080 |
| TER  | Teradyne                     | 13.487  | 0.51 | 0.48  | 16.66 | 0.560  | 17.220 | 0.01181 |
| TXN  | Texas Instruments            | 131.969 | 2.89 | 2.46  | 10    | 2.706  | 12.706 | 0.08529 |
| TMO  | Thermo Fisher Scientific     | 178.28  | 0.2  | 0.19  | 13.36 | 0.215  | 13.575 | 0.12311 |
| TJX  | TJX Companies Inc.           | 68.97   |      | 0.8   | 2.1   | 0.817  | 2.917  | 0.01023 |
| TSCO | Tractor Supply Company       | 16.783  | 1.14 | 1     | 16.65 | 1.167  | 17.817 | 0.01521 |
| TT   | Trane Technologies plc       | 30.381  | 1.71 |       | 3.04  | 1.710  | 4.750  | 0.00734 |
| TRV  | The Travelers Companies Inc. | 28.335  | 3.04 | 3.05  | 3.05  | 3.143  | 6.193  | 0.00893 |
| TSN  | Tyson Foods                  | 21.491  | 2.83 | 2.76  | 8.67  | 2.999  | 11.669 | 0.01276 |
| USB  | U.S. Bancorp                 | 56.835  | 4.57 | 4.57  | 2.43  | 4.681  | 7.111  | 0.02056 |
| UNP  | Union Pacific Corp           | 136.664 | 1.98 | 1.98  | 6.8   | 2.115  | 8.915  | 0.06197 |
| UNH  | United Health Group Inc.     | 302.349 | 1.6  | 1.44  | 12.72 | 1.623  | 14.343 | 0.22059 |
| UPS  | United Parcel Service        | 146.049 | 2.39 | 2.36  | 7.31  | 2.533  | 9.843  | 0.07312 |
| UHS  | Universal Health Services    | 9.476   |      | 0.55  | 10.3  | 0.607  | 10.907 | 0.00526 |



|      |                              |         |      |      |       |       |        |         |
|------|------------------------------|---------|------|------|-------|-------|--------|---------|
| UNM  | Unum Group                   | 3.758   | 6.45 | 6.45 | 9     | 7.031 | 16.031 | 0.00306 |
| VFC  | VF Corporation               | 29.189  | 2.65 | 2.58 | 5     | 2.709 | 7.709  | 0.01145 |
| VRSK | Verisk Analytics             | 29.52   | 0.58 | 0.57 | 9.67  | 0.625 | 10.295 | 0.01546 |
| VZ   | Verizon Communications       | 246.876 | 4.24 | 4.15 | 1.64  | 4.218 | 5.858  | 0.07356 |
| VIAC | ViacomCBS                    | 17.598  | 3.38 |      | 1.45  | 3.380 | 4.830  | 0.00432 |
| V    | Visa Inc.                    | 446.86  | 0.59 | 0.6  | 8.78  | 0.653 | 9.433  | 0.21441 |
| VNO  | Vornado Realty Trust         | 6.799   | 5.94 | 7.39 | 17.33 | 8.671 | 26.001 | 0.00899 |
| VMC  | Vulcan Materials             | 18.748  | 0.99 | 0.95 | 8.68  | 1.032 | 9.712  | 0.00926 |
| WRB  | W. R. Berkley Corporation    | 11.043  | 0.77 | 0.73 | 6.21  | 0.775 | 6.985  | 0.00392 |
| WAB  | Wabtec Corporation           | 12.261  | 0.74 | 0.77 | 7.3   | 0.826 | 8.126  | 0.00507 |
| WMT  | Walmart                      | 401.826 | 1.54 | 1.52 | 6.41  | 1.617 | 8.027  | 0.16408 |
| DIS  | The Walt Disney Company      | 222.937 |      | 0.72 | 1.95  | 0.734 | 2.684  | 0.03044 |
| WEC  | WEC Energy Group             | 30.957  | 2.59 | 2.5  | 5.95  | 2.649 | 8.599  | 0.01354 |
| WFC  | Wells Fargo                  | 100.735 | 1.67 | 8.5  | 3.45  | 8.793 | 12.243 | 0.06274 |
| WELL | Welltower Inc.               | 23.982  | 4.21 | 5.11 | 13    | 5.774 | 18.774 | 0.02290 |
| WST  | West Pharmaceutical Services | 22.886  | 0.22 | 0.23 | 15    | 0.265 | 15.265 | 0.01777 |
| WU   | Western Union Co             | 8.828   | 4.21 | 3.97 | 8.67  | 4.314 | 12.984 | 0.00583 |
| WY   | Weyerhaeuser                 | 22.187  |      | 3.5  | 5     | 3.675 | 8.675  | 0.00979 |
| WHR  | Whirlpool Corp.              | 12.022  | 2.61 | 2.61 | 0.2   | 2.615 | 2.815  | 0.00172 |
| WMB  | Williams Companies           | 23.713  | 8.38 | 8.17 | 3.7   | 8.472 | 12.172 | 0.01468 |
| WLTW | Willis Towers Watson         | 27.078  | 1.3  | 1.28 | 4.85  | 1.342 | 6.192  | 0.00853 |
| WYNN | Wynn Resorts Ltd             | 7.965   |      | 2.73 | 5.46  | 2.879 | 8.339  | 0.00338 |
| XEL  | Xcel Energy Inc              | 37.546  | 2.44 | 2.37 | 5.85  | 2.509 | 8.359  | 0.01596 |
| XLNX | Xilinx                       | 25.589  | 1.48 | 1.45 | 7.47  | 1.558 | 9.028  | 0.01175 |
| YUM  | Yum! Brands Inc              | 28.359  | 2    | 1.92 | 6.63  | 2.047 | 8.677  | 0.01252 |
| ZBH  | Zimmer Biomet Holdings       | 29.316  | 0.7  | 0.7  | 3.66  | 0.726 | 4.386  | 0.00654 |
| ZTS  | Zoetis                       | 77.662  | 0.49 | 0.45 | 8.97  | 0.490 | 9.460  | 0.03737 |

Total Market Capitalization  
19659

Market  
Return  
10.92

Average 30-year T-bond yield April - September,  
2020

1.37

Market Risk Premium

9.54

Market Capitalization was obtained as of October 5, 2020  
So were forward dividend yield, trailing dividend yield and projected next 5-year earnings  
growth.  
From Finance.yahoo.com

| CAPM   |      |                |                     |             |        |
|--|------|----------------|---------------------|-------------|--------|
| Market Return based on IBES Expected Earnings Forecast |      |                |                     |             |        |
| Company  | [1]  | [2]            | [3]                 | [4]         | [5]    |
|  | Beta | Risk Free Rate | Market Risk Premium | Adjusted RP | ROE    |
| 1 Allete Inc   | 0.85 | 1.37%          | 9.54%               | 8.11%       | 9.48%  |
| 2 Alliant Energy Corp                                  | 0.85 | 1.37%          | 9.54%               | 8.11%       | 9.48%  |
| 3 Ameren Corp  | 0.8  | 1.37%          | 9.54%               | 7.63%       | 9.01%  |
| American Electric Power Company                        |      |                |                     |             |        |
| 4 Inc  | 0.5  | 1.37%          | 9.54%               | 4.77%       | 6.14%  |
| 5 AVANGRID Inc.  | 0.8  | 1.37%          | 9.54%               | 7.63%       | 9.01%  |
| 6 Avista Corp  | 0.95 | 1.37%          | 9.54%               | 9.07%       | 10.44% |
| 7 Black Hills Corp                                     | 1    | 1.37%          | 9.54%               | 9.54%       | 10.92% |
| 8 CenterPoint Energy                                   | 1.1  | 1.37%          | 9.54%               | 10.50%      | 11.87% |
| 9 CMS Energy Corp                                      | 0.8  | 1.37%          | 9.54%               | 7.63%       | 9.01%  |
| 10 Consolidated Edison Inc                             | 0.75 | 1.37%          | 9.54%               | 7.16%       | 8.53%  |
| 11 Dominion Energy                                     | 0.8  | 1.37%          | 9.54%               | 7.63%       | 9.01%  |
| 12 DTE Energy Company                                  | 0.9  | 1.37%          | 9.54%               | 8.59%       | 9.96%  |
| 13 Duke Energy Corp                                    | 0.85 | 1.37%          | 9.54%               | 8.11%       | 9.48%  |
| 14 Edison International                                | 0.9  | 1.37%          | 9.54%               | 8.59%       | 9.96%  |
| 15 Entergy Corp  | 0.95 | 1.37%          | 9.54%               | 9.07%       | 10.44% |
| 16 Evergy  | 1    | 1.37%          | 9.54%               | 9.54%       | 10.92% |
| 17 Eversource Energy                                   | 0.9  | 1.37%          | 9.54%               | 8.59%       | 9.96%  |
| 18 Exelon Corp   | 0.95 | 1.37%          | 9.54%               | 9.07%       | 10.44% |
| 19 FirstEnergy   | 0.85 | 1.37%          | 9.54%               | 8.11%       | 9.48%  |
| 20 Fortis Inc  | 0.8  | 1.37%          | 9.54%               | 7.63%       | 9.01%  |
| 21 Hawaiian Electric Industries Inc                    | 0.8  | 1.37%          | 9.54%               | 7.63%       | 9.01%  |
| 22 IDACORP Inc   | 0.8  | 1.37%          | 9.54%               | 7.63%       | 9.01%  |
| 23 NextEra Energy                                      | 0.85 | 1.37%          | 9.54%               | 8.11%       | 9.48%  |
| 24 NorthWestern Corporation                            | 0.9  | 1.37%          | 9.54%               | 8.59%       | 9.96%  |
| 25 OGE Energy Corp                                     | 1.05 | 1.37%          | 9.54%               | 10.02%      | 11.39% |

|    |                                     |      |       |       |        |        |
|----|-------------------------------------|------|-------|-------|--------|--------|
| 26 | Otter Tail Corp                     | 0.85 | 1.37% | 9.54% | 8.11%  | 9.48%  |
| 27 | PNM Resources                       | 0.9  | 1.37% | 9.54% | 8.59%  | 9.96%  |
| 28 | PPL Corporation                     | 1.1  | 1.37% | 9.54% | 10.50% | 11.87% |
| 29 | Public Service Enterprise Group Inc | 0.9  | 1.37% | 9.54% | 8.59%  | 9.96%  |
| 30 | Sempra                              | 0.95 | 1.37% | 9.54% | 9.07%  | 10.44% |
| 31 | Southern Co                         | 0.9  | 1.37% | 9.54% | 8.59%  | 9.96%  |
| 32 | WEC Energy Group                    | 0.8  | 1.37% | 9.54% | 7.63%  | 9.01%  |
| 33 | Xcel Energy Inc                     | 0.75 | 1.37% | 9.54% | 7.16%  | 8.53%  |
|    | Min                                 | 0.50 |       |       |        | 6.14%  |
|    | Max                                 | 1.10 |       |       |        | 11.87% |
|    | Median                              | 0.85 |       |       |        | 9.48%  |
|    | Average                             | 0.87 |       |       |        | 9.72%  |
|    | Midpoint                            | 0.80 |       |       |        | 9.01%  |

- [1] Betas are from three latest issues of Value Line (July, August and September 2020)
- [2] 6-month Average 30- year U.S. Treasury bond yields are from April - September 2020
- [3] MRP - See Exhibit\_\_\_\_(ZZ-6)
- [4] [1]x[3]
- [5] [2]+[4]

| <i><b>Filing Date</b></i> | <i><b>Decision Date</b></i> | <i><b>Authorized ROE</b></i> | <i><b>Rate Case Duration (months)</b></i> | <i><b>Interest Rate</b></i> | <i><b>Risk Premium</b></i> |
|---------------------------|-----------------------------|------------------------------|---|-----------------------------|----------------------------|
| 11/30/1979                | 1/1/1980                    | 14.50                        | 1   | 10.12                       | 4.38                       |
| 4/6/1979                  | 1/7/1980                    | 14.39                        | 9   | 9.41                        | 4.98                       |
| 10/1/1979                 | 1/23/1980                   | 15.50                        | 3   | 10.15                       | 5.35                       |
| 4/29/1979                 | 1/30/1980                   | 13.86                        | 9   | 9.55                        | 4.31                       |
| 7/17/1979                 | 1/31/1980                   | 12.61                        | 6   | 9.76                        | 2.85                       |
| 4/6/1979                  | 2/6/1980                    | 13.71                        | 10  | 9.56                        | 4.15                       |
| 10/17/1979                | 2/13/1980                   | 12.80                        | 3   | 10.45                       | 2.35                       |
| 5/31/1979                 | 2/14/1980                   | 13.00                        | 8   | 9.70                        | 3.30                       |
| 8/2/1979                  | 2/27/1980                   | 13.75                        | 6   | 10.11                       | 3.64                       |
| 10/23/1978                | 2/29/1980                   | 13.75                        | 16  | 9.57                        | 4.18                       |
| 4/6/1979                  | 2/29/1980                   | 14.00                        | 10  | 9.74                        | 4.26                       |
| 5/22/1979                 | 2/29/1980                   | 14.77                        | 9   | 9.84                        | 4.93                       |
| 9/10/1979                 | 3/7/1980                    | 12.70                        | 5   | 10.48                       | 2.22                       |
| 10/30/1979                | 3/26/1980                   | 14.16                        | 4   | 11.04                       | 3.12                       |
| 5/1/1979                  | 3/27/1980                   | 14.24                        | 11  | 10.01                       | 4.23                       |
| 12/28/1979                | 3/28/1980                   | 14.50                        | 3   | 11.60                       | 2.90                       |
| 6/11/1979                 | 4/11/1980                   | 12.75                        | 10  | 10.21                       | 2.54                       |
| 9/17/1979                 | 4/14/1980                   | 13.85                        | 7   | 10.82                       | 3.03                       |
| 12/7/1979                 | 4/16/1980                   | 15.50                        | 4   | 11.40                       | 4.10                       |
| 8/31/1979                 | 4/22/1980                   | 13.90                        | 7   | 10.72                       | 3.18                       |
| 8/16/1979                 | 4/22/1980                   | 13.25                        | 8   | 10.61                       | 2.64                       |
| 10/4/1979                 | 4/24/1980                   | 16.80                        | 6   | 10.99                       | 5.81                       |
| 1/4/1980                  | 4/29/1980                   | 15.50                        | 3   | 11.63                       | 3.87                       |
| 9/21/1979                 | 5/6/1980                    | 13.70                        | 7   | 10.87                       | 2.83                       |
| 6/22/1979                 | 5/7/1980                    | 15.00                        | 10  | 10.32                       | 4.68                       |
| 4/2/1979                  | 5/8/1980                    | 13.75                        | 13  | 10.07                       | 3.68                       |
| 7/27/1979                 | 5/9/1980                    | 14.35                        | 9   | 10.50                       | 3.85                       |
| 8/15/1979                 | 5/13/1980                   | 13.60                        | 9   | 10.60                       | 3.00                       |
| 2/15/1979                 | 5/15/1980                   | 13.25                        | 15  | 9.97                        | 3.28                       |
| 5/25/1979                 | 5/19/1980                   | 13.75                        | 12  | 10.23                       | 3.52                       |
| 3/26/1980                 | 5/27/1980                   | 14.60                        | 2   | 11.07                       | 3.53                       |
| 11/2/1979                 | 5/29/1980                   | 16.00                        | 6   | 11.04                       | 4.96                       |
| 11/16/1979                | 5/30/1980                   | 13.80                        | 6   | 11.08                       | 2.72                       |
| 2/28/1980                 | 6/2/1980                    | 15.63                        | 3   | 11.38                       | 4.25                       |
| 11/13/1979                | 6/10/1980                   | 13.78                        | 7   | 11.01                       | 2.77                       |
| 1/16/1980                 | 6/12/1980                   | 14.25                        | 4   | 11.32                       | 2.93                       |
| 8/3/1979                  | 6/19/1980                   | 13.40                        | 10  | 10.48                       | 2.92                       |
| 8/16/1979                 | 7/9/1980                    | 14.75                        | 10  | 10.51                       | 4.24                       |
| 9/17/1979                 | 7/10/1980                   | 15.00                        | 9   | 10.66                       | 4.34                       |
| 2/22/1980                 | 7/15/1980                   | 15.80                        | 4   | 10.99                       | 4.81                       |
| 8/24/1979                 | 7/18/1980                   | 13.80                        | 10  | 10.54                       | 3.26                       |
| 8/28/1979                 | 7/22/1980                   | 14.10                        | 10  | 10.55                       | 3.55                       |
| 4/25/1980                 | 7/24/1980                   | 15.00                        | 3   | 10.16                       | 4.84                       |
| 3/21/1980                 | 7/25/1980                   | 13.48                        | 4   | 10.61                       | 2.87                       |
| 10/19/1979                | 7/31/1980                   | 14.58                        | 9   | 10.78                       | 3.80                       |
| 2/25/1980                 | 8/8/1980                    | 14.00                        | 5   | 10.90                       | 3.10                       |

|            |            |       |    |       |      |
|------------|------------|-------|----|-------|------|
| 1/29/1979  | 8/8/1980   | 13.50 | 18 | 9.97  | 3.53 |
| 3/10/1980  | 8/8/1980   | 15.45 | 5  | 10.74 | 4.71 |
| 3/17/1980  | 8/11/1980  | 14.85 | 4  | 10.68 | 4.17 |
| 12/28/1979 | 8/14/1980  | 14.00 | 7  | 10.94 | 3.06 |
| 5/22/1980  | 8/14/1980  | 16.25 | 2  | 10.19 | 6.06 |
| 10/5/1979  | 8/25/1980  | 13.75 | 10 | 10.74 | 3.01 |
| 2/20/1980  | 8/27/1980  | 13.80 | 6  | 10.95 | 2.85 |
| 6/30/1980  | 9/15/1980  | 15.80 | 2  | 10.69 | 5.11 |
| 3/31/1980  | 9/15/1980  | 13.50 | 5  | 10.62 | 2.88 |
| 3/29/1978  | 9/24/1980  | 12.50 | 30 | 10.01 | 2.49 |
| 3/31/1980  | 9/24/1980  | 15.00 | 5  | 10.67 | 4.33 |
| 11/30/1979 | 9/26/1980  | 13.75 | 10 | 10.91 | 2.84 |
| 3/14/1980  | 9/30/1980  | 14.20 | 6  | 10.83 | 3.37 |
| 2/29/1980  | 9/30/1980  | 14.10 | 7  | 10.93 | 3.17 |
| 4/7/1980   | 10/1/1980  | 13.90 | 5  | 10.66 | 3.24 |
| 12/15/1978 | 10/7/1980  | 12.50 | 22 | 10.05 | 2.45 |
| 5/5/1980   | 10/9/1980  | 14.50 | 5  | 10.60 | 3.90 |
| 5/5/1980   | 10/9/1980  | 14.50 | 5  | 10.60 | 3.90 |
| 6/17/1980  | 10/16/1980 | 16.10 | 4  | 10.78 | 5.32 |
| 4/16/1980  | 10/31/1980 | 14.25 | 6  | 10.75 | 3.50 |
| 2/1/1980   | 10/31/1980 | 13.75 | 9  | 11.12 | 2.63 |
| 4/30/1980  | 11/4/1980  | 15.00 | 6  | 10.74 | 4.26 |
| 4/8/1980   | 11/5/1980  | 14.00 | 7  | 10.80 | 3.20 |
| 4/18/1980  | 11/5/1980  | 13.75 | 6  | 10.77 | 2.98 |
| 4/15/1980  | 11/8/1980  | 13.75 | 6  | 10.80 | 2.95 |
| 12/11/1979 | 11/17/1980 | 14.00 | 11 | 11.07 | 2.93 |
| 1/17/1979  | 11/18/1980 | 14.00 | 22 | 10.18 | 3.82 |
| 6/26/1980  | 11/19/1980 | 13.00 | 4  | 11.16 | 1.84 |
| 5/28/1980  | 11/24/1980 | 14.00 | 6  | 10.97 | 3.03 |
| 5/15/1980  | 11/26/1980 | 14.00 | 6  | 10.95 | 3.05 |
| 7/3/1980   | 12/8/1980  | 15.10 | 5  | 11.35 | 3.75 |
| 5/9/1980   | 12/8/1980  | 14.15 | 7  | 11.00 | 3.15 |
| 9/30/1980  | 12/9/1980  | 15.35 | 2  | 12.00 | 3.35 |
| 5/7/1980   | 12/12/1980 | 15.45 | 7  | 11.04 | 4.41 |
| 6/27/1980  | 12/17/1980 | 13.25 | 5  | 11.39 | 1.86 |
| 8/1/1980   | 12/18/1980 | 15.80 | 4  | 11.70 | 4.10 |
| 5/23/1980  | 12/19/1980 | 14.64 | 7  | 11.15 | 3.49 |
| 4/7/1980   | 12/22/1980 | 13.45 | 8  | 11.10 | 2.35 |
| 7/2/1980   | 12/22/1980 | 15.00 | 5  | 11.45 | 3.55 |
| 7/1/1980   | 12/30/1980 | 14.50 | 6  | 11.45 | 3.05 |
| 5/16/1980  | 12/31/1980 | 13.39 | 7  | 11.17 | 2.22 |
| 2/15/1980  | 1/7/1981   | 14.30 | 10 | 11.33 | 2.97 |
| 12/28/1979 | 1/19/1981  | 15.25 | 12 | 11.30 | 3.95 |
| 6/30/1980  | 1/23/1981  | 14.40 | 6  | 11.52 | 2.88 |
| 8/18/1980  | 1/23/1981  | 13.10 | 5  | 11.86 | 1.24 |
| 3/3/1980   | 1/27/1981  | 15.00 | 11 | 11.33 | 3.67 |
| 4/29/1980  | 2/3/1981   | 15.25 | 9  | 11.24 | 4.01 |
| 4/29/1980  | 2/5/1981   | 15.75 | 9  | 11.25 | 4.50 |
| 5/7/1980   | 2/11/1981  | 15.60 | 9  | 11.31 | 4.29 |
| 4/29/1980  | 2/20/1981  | 15.25 | 9  | 11.32 | 3.93 |

|            |           |       |    |       |      |
|------------|-----------|-------|----|-------|------|
| 4/18/1980  | 3/12/1981 | 14.51 | 10 | 11.41 | 3.10 |
| 4/18/1980  | 3/12/1981 | 16.00 | 10 | 11.41 | 4.59 |
| 4/25/1980  | 3/13/1981 | 13.02 | 10 | 11.42 | 1.60 |
| 5/29/1980  | 3/18/1981 | 16.19 | 9  | 11.55 | 4.64 |
| 12/19/1980 | 3/19/1981 | 13.75 | 3  | 12.43 | 1.32 |
| 4/25/1980  | 3/23/1981 | 14.30 | 11 | 11.45 | 2.85 |
| 5/1/1980   | 3/25/1981 | 15.30 | 10 | 11.47 | 3.83 |
| 6/30/1980  | 4/1/1981  | 14.53 | 9  | 11.81 | 2.72 |
| 7/23/1980  | 4/3/1981  | 19.10 | 8  | 11.97 | 7.13 |
| 4/18/1980  | 4/9/1981  | 15.00 | 11 | 11.52 | 3.48 |
| 7/3/1980   | 4/9/1981  | 15.30 | 9  | 11.87 | 3.43 |
| 7/29/1980  | 4/9/1981  | 17.00 | 8  | 12.04 | 4.96 |
| 7/29/1980  | 4/9/1981  | 16.50 | 8  | 12.04 | 4.46 |
| 5/22/1980  | 4/15/1981 | 15.30 | 10 | 11.64 | 3.66 |
| 10/20/1980 | 4/16/1981 | 13.50 | 5  | 12.49 | 1.01 |
| 11/5/1980  | 4/17/1981 | 14.10 | 5  | 12.54 | 1.56 |
| 9/30/1980  | 4/21/1981 | 16.80 | 6  | 12.39 | 4.41 |
| 7/29/1980  | 4/24/1981 | 16.00 | 8  | 12.10 | 3.90 |
| 1/25/1980  | 4/27/1981 | 13.61 | 15 | 11.67 | 1.94 |
| 3/19/1979  | 4/27/1981 | 12.50 | 25 | 10.77 | 1.73 |
| 1/30/1981  | 4/29/1981 | 13.65 | 2  | 12.88 | 0.77 |
| 7/16/1980  | 5/4/1981  | 16.22 | 9  | 12.06 | 4.16 |
| 10/11/1979 | 5/5/1981  | 14.40 | 19 | 11.44 | 2.96 |
| 4/7/1981   | 5/7/1981  | 16.27 | 1  | 13.41 | 2.86 |
| 4/30/1979  | 5/8/1981  | 13.00 | 24 | 10.92 | 2.08 |
| 11/12/1980 | 5/15/1981 | 15.75 | 6  | 12.71 | 3.04 |
| 5/20/1980  | 5/18/1981 | 14.88 | 12 | 11.81 | 3.07 |
| 5/29/1980  | 5/20/1981 | 16.00 | 11 | 11.86 | 4.14 |
| 7/15/1980  | 5/21/1981 | 14.00 | 10 | 12.15 | 1.85 |
| 5/27/1980  | 5/26/1981 | 14.90 | 12 | 11.86 | 3.04 |
| 5/29/1980  | 5/27/1981 | 15.00 | 12 | 11.88 | 3.12 |
| 1/20/1981  | 5/29/1981 | 15.50 | 4  | 13.00 | 2.50 |
| 7/11/1980  | 6/3/1981  | 14.67 | 10 | 12.17 | 2.50 |
| 6/8/1979   | 6/5/1981  | 13.00 | 24 | 11.11 | 1.89 |
| 12/8/1980  | 6/10/1981 | 16.75 | 6  | 12.82 | 3.93 |
| 8/6/1980   | 6/17/1981 | 14.40 | 10 | 12.36 | 2.04 |
| 2/5/1981   | 6/18/1981 | 16.33 | 4  | 13.06 | 3.27 |
| 9/26/1980  | 6/26/1981 | 16.00 | 9  | 12.61 | 3.39 |
| 4/30/1981  | 6/30/1981 | 15.25 | 2  | 13.28 | 1.97 |
| 8/8/1980   | 7/1/1981  | 15.50 | 10 | 12.40 | 3.10 |
| 8/8/1980   | 7/1/1981  | 17.50 | 10 | 12.40 | 5.10 |
| 8/28/1980  | 7/10/1981 | 16.00 | 10 | 12.52 | 3.48 |
| 8/21/1980  | 7/14/1981 | 16.90 | 10 | 12.50 | 4.40 |
| 10/9/1980  | 7/15/1981 | 16.00 | 9  | 12.71 | 3.29 |
| 7/23/1980  | 7/17/1981 | 15.00 | 11 | 12.36 | 2.64 |
| 7/24/1980  | 7/20/1981 | 15.00 | 12 | 12.37 | 2.63 |
| 4/13/1981  | 7/28/1981 | 13.48 | 3  | 13.35 | 0.13 |
| 6/30/1978  | 7/31/1981 | 13.50 | 37 | 10.90 | 2.60 |
| 3/6/1981   | 8/5/1981  | 15.71 | 5  | 13.24 | 2.47 |
| 12/8/1980  | 8/10/1981 | 14.50 | 8  | 12.98 | 1.52 |

|            |            |       |    |       |      |
|------------|------------|-------|----|-------|------|
| 2/17/1981  | 8/11/1981  | 15.00 | 5  | 13.22 | 1.78 |
| 5/21/1981  | 8/20/1981  | 16.50 | 3  | 13.43 | 3.07 |
| 12/17/1979 | 8/20/1981  | 13.50 | 20 | 11.94 | 1.56 |
| 3/31/1981  | 8/24/1981  | 15.00 | 4  | 13.44 | 1.56 |
| 3/2/1981   | 8/28/1981  | 15.00 | 5  | 13.35 | 1.65 |
| 1/5/1981   | 9/3/1981   | 14.50 | 8  | 13.18 | 1.32 |
| 3/23/1981  | 9/11/1981  | 16.00 | 5  | 13.54 | 2.46 |
| 2/23/1981  | 9/16/1981  | 16.00 | 6  | 13.44 | 2.56 |
| 5/1/1981   | 9/17/1981  | 16.50 | 4  | 13.71 | 2.79 |
| 4/22/1981  | 9/28/1981  | 15.50 | 5  | 13.74 | 1.76 |
| 5/15/1981  | 10/9/1981  | 15.75 | 4  | 13.84 | 1.91 |
| 7/6/1981   | 10/15/1981 | 16.25 | 3  | 14.21 | 2.04 |
| 4/2/1981   | 10/16/1981 | 16.50 | 6  | 13.77 | 2.73 |
| 12/30/1980 | 10/16/1981 | 15.50 | 9  | 13.37 | 2.13 |
| 1/5/1981   | 10/19/1981 | 14.25 | 9  | 13.40 | 0.85 |
| 3/20/1981  | 10/20/1981 | 15.25 | 7  | 13.72 | 1.53 |
| 11/30/1980 | 10/23/1981 | 16.00 | 10 | 13.32 | 2.68 |
| 11/18/1980 | 10/29/1981 | 16.50 | 11 | 13.31 | 3.19 |
| 3/31/1981  | 10/29/1981 | 14.75 | 7  | 13.82 | 0.93 |
| 9/30/1980  | 11/3/1981  | 15.17 | 13 | 13.15 | 2.02 |
| 6/2/1980   | 11/6/1981  | 15.17 | 17 | 12.55 | 2.62 |
| 4/30/1981  | 11/24/1981 | 15.50 | 6  | 13.89 | 1.61 |
| 7/2/1981   | 11/25/1981 | 16.10 | 4  | 14.14 | 1.96 |
| 7/2/1981   | 11/25/1981 | 16.10 | 4  | 14.14 | 1.96 |
| 3/6/1981   | 11/25/1981 | 15.25 | 8  | 13.68 | 1.57 |
| 1/29/1981  | 11/25/1981 | 15.35 | 10 | 13.57 | 1.78 |
| 3/16/1981  | 12/1/1981  | 16.50 | 8  | 13.70 | 2.80 |
| 5/18/1981  | 12/1/1981  | 15.70 | 6  | 13.86 | 1.84 |
| 4/6/1981   | 12/1/1981  | 16.49 | 7  | 13.80 | 2.69 |
| 1/5/1981   | 12/1/1981  | 16.00 | 11 | 13.45 | 2.55 |
| 9/4/1980   | 12/4/1981  | 16.00 | 15 | 13.05 | 2.95 |
| 4/16/1981  | 12/11/1981 | 16.25 | 7  | 13.80 | 2.45 |
| 6/15/1981  | 12/14/1981 | 14.00 | 6  | 13.93 | 0.07 |
| 5/15/1981  | 12/15/1981 | 16.00 | 7  | 13.82 | 2.18 |
| 5/12/1981  | 12/18/1981 | 15.45 | 7  | 13.81 | 1.64 |
| 9/17/1980  | 12/30/1981 | 14.25 | 15 | 13.13 | 1.12 |
| 5/11/1981  | 12/31/1981 | 16.15 | 7  | 13.81 | 2.34 |
| 7/10/1981  | 1/4/1982   | 15.50 | 5  | 14.03 | 1.47 |
| 5/1/1981   | 1/11/1982  | 14.50 | 8  | 13.83 | 0.67 |
| 5/6/1981   | 1/13/1982  | 14.75 | 8  | 13.83 | 0.92 |
| 12/30/1980 | 1/15/1982  | 15.00 | 12 | 13.47 | 1.53 |
| 9/16/1980  | 1/15/1982  | 16.50 | 16 | 13.16 | 3.34 |
| 4/15/1981  | 1/22/1982  | 16.25 | 9  | 13.82 | 2.43 |
| 4/16/1981  | 1/27/1982  | 16.84 | 9  | 13.83 | 3.01 |
| 7/17/1981  | 1/29/1982  | 15.50 | 6  | 14.08 | 1.42 |
| 5/29/1981  | 2/1/1982   | 15.85 | 8  | 13.88 | 1.97 |
| 4/14/1981  | 2/3/1982   | 16.44 | 9  | 13.83 | 2.61 |
| 7/10/1981  | 2/8/1982   | 15.50 | 7  | 14.07 | 1.43 |
| 2/13/1981  | 2/11/1982  | 16.00 | 12 | 13.68 | 2.32 |
| 11/25/1981 | 2/11/1982  | 16.20 | 2  | 13.89 | 2.31 |



|            |           |       |    |       |      |
|------------|-----------|-------|----|-------|------|
| 7/15/1981  | 2/17/1982 | 15.00 | 7  | 14.10 | 0.90 |
| 8/1/1980   | 2/19/1982 | 15.17 | 18 | 13.06 | 2.11 |
| 8/14/1981  | 2/26/1982 | 15.25 | 6  | 14.13 | 1.12 |
| 5/1/1981   | 3/1/1982  | 15.03 | 10 | 13.89 | 1.14 |
| 2/20/1981  | 3/3/1982  | 15.00 | 12 | 13.70 | 1.30 |
| 4/16/1981  | 3/8/1982  | 17.10 | 10 | 13.85 | 3.25 |
| 5/14/1981  | 3/12/1982 | 16.25 | 10 | 13.87 | 2.38 |
| 5/5/1981   | 3/17/1982 | 17.30 | 10 | 13.87 | 3.43 |
| 4/20/1981  | 3/22/1982 | 15.10 | 11 | 13.84 | 1.26 |
| 7/1/1981   | 3/30/1982 | 15.50 | 9  | 13.99 | 1.51 |
| 7/2/1981   | 3/31/1982 | 17.00 | 9  | 13.99 | 3.01 |
| 10/5/1981  | 4/1/1982  | 16.50 | 5  | 13.89 | 2.61 |
| 10/28/1981 | 4/2/1982  | 15.50 | 5  | 13.77 | 1.73 |
| 11/4/1981  | 4/5/1982  | 15.50 | 5  | 13.73 | 1.77 |
| 7/9/1981   | 4/8/1982  | 16.40 | 9  | 13.99 | 2.41 |
| 10/13/1981 | 4/13/1982 | 14.50 | 6  | 13.84 | 0.66 |
| 7/24/1981  | 4/23/1982 | 15.75 | 9  | 13.98 | 1.77 |
| 7/15/1981  | 4/27/1982 | 15.00 | 9  | 13.96 | 1.04 |
| 9/29/1981  | 4/28/1982 | 15.75 | 7  | 13.85 | 1.90 |
| 10/16/1981 | 4/30/1982 | 15.50 | 6  | 13.77 | 1.73 |
| 11/9/1981  | 5/3/1982  | 16.60 | 5  | 13.66 | 2.94 |
| 12/21/1981 | 5/14/1982 | 15.50 | 4  | 13.75 | 1.75 |
| 2/6/1981   | 5/18/1982 | 15.42 | 15 | 13.63 | 1.79 |
| 8/7/1981   | 5/19/1982 | 14.69 | 9  | 13.91 | 0.78 |
| 4/24/1981  | 5/20/1982 | 15.10 | 13 | 13.78 | 1.32 |
| 8/21/1981  | 5/20/1982 | 15.50 | 9  | 13.91 | 1.59 |
| 9/11/1981  | 5/20/1982 | 15.00 | 8  | 13.84 | 1.16 |
| 7/29/1981  | 5/21/1982 | 17.75 | 9  | 13.91 | 3.84 |
| 11/16/1981 | 5/28/1982 | 15.50 | 6  | 13.61 | 1.89 |
| 11/13/1981 | 5/28/1982 | 17.00 | 6  | 13.61 | 3.39 |
| 8/21/1981  | 6/9/1982  | 17.86 | 9  | 13.88 | 3.98 |
| 11/16/1981 | 6/14/1982 | 15.75 | 7  | 13.62 | 2.13 |
| 12/29/1981 | 6/18/1982 | 15.50 | 5  | 13.71 | 1.79 |
| 7/31/1981  | 6/21/1982 | 14.90 | 10 | 13.89 | 1.01 |
| 2/12/1982  | 6/23/1982 | 16.00 | 4  | 13.54 | 2.46 |
| 3/18/1982  | 6/23/1982 | 16.17 | 3  | 13.49 | 2.68 |
| 5/6/1981   | 7/1/1982  | 16.00 | 14 | 13.78 | 2.22 |
| 8/17/1981  | 7/2/1982  | 15.62 | 10 | 13.89 | 1.73 |
| 5/21/1982  | 7/2/1982  | 17.00 | 1  | 13.81 | 3.19 |
| 12/18/1981 | 7/13/1982 | 14.00 | 6  | 13.74 | 0.26 |
| 8/21/1981  | 7/13/1982 | 16.80 | 10 | 13.89 | 2.91 |
| 8/26/1981  | 7/14/1982 | 15.76 | 10 | 13.88 | 1.88 |
| 9/30/1981  | 7/14/1982 | 16.02 | 9  | 13.78 | 2.24 |
| 2/23/1982  | 7/19/1982 | 16.50 | 4  | 13.56 | 2.94 |
| 9/11/1981  | 7/22/1982 | 14.50 | 10 | 13.82 | 0.68 |
| 12/18/1981 | 7/27/1982 | 16.75 | 7  | 13.72 | 3.03 |
| 3/26/1982  | 7/29/1982 | 16.50 | 4  | 13.55 | 2.95 |
| 11/16/1981 | 8/11/1982 | 17.50 | 8  | 13.63 | 3.87 |
| 10/2/1981  | 8/25/1982 | 16.00 | 10 | 13.68 | 2.32 |
| 4/5/1982   | 9/3/1982  | 16.20 | 5  | 13.34 | 2.86 |

|            |            |       |    |       |        |
|------------|------------|-------|----|-------|--------|
| 7/15/1982  | 9/8/1982   | 15.00 | 1  | 12.90 | 2.10   |
| 11/23/1981 | 9/15/1982  | 13.08 | 9  | 13.50 | (0.42) |
| 10/30/1981 | 9/15/1982  | 16.25 | 10 | 13.50 | 2.75   |
| 3/17/1982  | 9/17/1982  | 15.25 | 6  | 13.29 | 1.96   |
| 2/19/1982  | 9/24/1982  | 14.50 | 7  | 13.28 | 1.22   |
| 3/1/1982   | 9/27/1982  | 15.25 | 7  | 13.25 | 2.00   |
| 11/23/1981 | 10/15/1982 | 15.90 | 10 | 13.32 | 2.58   |
| 4/5/1982   | 10/22/1982 | 15.75 | 6  | 12.94 | 2.81   |
| 5/28/1982  | 10/22/1982 | 17.15 | 4  | 12.81 | 4.34   |
| 1/8/1982   | 10/29/1982 | 15.54 | 9  | 13.19 | 2.35   |
| 3/31/1982  | 11/1/1982  | 15.50 | 7  | 12.88 | 2.62   |
| 1/4/1982   | 11/3/1982  | 17.20 | 10 | 13.18 | 4.02   |
| 7/30/1982  | 11/4/1982  | 16.25 | 3  | 12.00 | 4.25   |
| 12/31/1981 | 11/5/1982  | 16.20 | 10 | 13.16 | 3.04   |
| 5/14/1982  | 11/9/1982  | 16.00 | 5  | 12.67 | 3.33   |
| 1/4/1982   | 11/23/1982 | 15.50 | 10 | 13.02 | 2.48   |
| 2/19/1982  | 12/6/1982  | 15.00 | 9  | 12.72 | 2.28   |
| 5/14/1982  | 12/10/1982 | 15.50 | 7  | 12.36 | 3.14   |
| 7/30/1982  | 12/14/1982 | 16.40 | 4  | 11.58 | 4.82   |
| 6/1/1982   | 12/14/1982 | 15.30 | 6  | 12.26 | 3.04   |
| 4/16/1982  | 12/20/1982 | 16.00 | 8  | 12.40 | 3.60   |
| 6/4/1982   | 12/21/1982 | 15.85 | 6  | 12.17 | 3.68   |
| 12/30/1981 | 12/21/1982 | 14.75 | 11 | 12.84 | 1.91   |
| 3/8/1982   | 12/22/1982 | 16.75 | 9  | 12.54 | 4.21   |
| 2/8/1982   | 12/22/1982 | 16.58 | 10 | 12.66 | 3.92   |
| 9/13/1982  | 12/22/1982 | 16.25 | 3  | 11.02 | 5.23   |
| 3/17/1982  | 12/29/1982 | 14.90 | 9  | 12.46 | 2.44   |
| 3/17/1982  | 12/29/1982 | 16.25 | 9  | 12.46 | 3.79   |
| 6/25/1982  | 12/30/1982 | 16.35 | 6  | 11.88 | 4.47   |
| 6/29/1982  | 12/30/1982 | 16.00 | 6  | 11.85 | 4.15   |
| 7/28/1982  | 12/30/1982 | 16.77 | 5  | 11.51 | 5.26   |
| 3/19/1982  | 1/5/1983   | 17.33 | 9  | 12.40 | 4.93   |
| 2/18/1982  | 1/11/1983  | 15.90 | 10 | 12.48 | 3.42   |
| 2/19/1982  | 1/12/1983  | 15.50 | 10 | 12.47 | 3.03   |
| 7/6/1982   | 1/12/1983  | 14.63 | 6  | 11.69 | 2.94   |
| 3/26/1982  | 1/20/1983  | 17.75 | 10 | 12.28 | 5.47   |
| 7/30/1982  | 1/21/1983  | 15.00 | 5  | 11.35 | 3.65   |
| 2/26/1982  | 1/24/1983  | 15.50 | 11 | 12.37 | 3.13   |
| 3/17/1982  | 2/1/1983   | 18.50 | 10 | 12.27 | 6.23   |
| 4/8/1982   | 2/4/1983   | 14.00 | 10 | 12.15 | 1.85   |
| 4/13/1982  | 2/10/1983  | 15.00 | 10 | 12.11 | 2.89   |
| 7/28/1982  | 2/22/1983  | 15.50 | 6  | 11.32 | 4.18   |
| 9/10/1982  | 3/2/1983   | 15.25 | 5  | 10.90 | 4.35   |
| 4/16/1982  | 3/9/1983   | 15.20 | 10 | 11.98 | 3.22   |
| 9/22/1982  | 3/18/1983  | 15.25 | 5  | 10.79 | 4.46   |
| 4/30/1982  | 3/23/1983  | 15.40 | 10 | 11.87 | 3.53   |
| 7/2/1982   | 3/24/1983  | 15.00 | 8  | 11.44 | 3.56   |
| 8/3/1982   | 3/29/1983  | 15.50 | 7  | 11.16 | 4.34   |
| 7/2/1982   | 3/30/1983  | 16.71 | 9  | 11.42 | 5.29   |
| 7/2/1982   | 4/4/1983   | 15.20 | 9  | 11.42 | 3.78   |

|            |            |       |    |       |      |
|------------|------------|-------|----|-------|------|
| 8/13/1982  | 4/8/1983   | 15.50 | 7  | 11.03 | 4.47 |
| 6/23/1982  | 4/11/1983  | 14.81 | 9  | 11.49 | 3.32 |
| 4/27/1982  | 4/19/1983  | 14.50 | 11 | 11.79 | 2.71 |
| 10/15/1982 | 4/29/1983  | 16.00 | 6  | 10.65 | 5.35 |
| 11/17/1982 | 5/1/1983   | 14.50 | 5  | 10.62 | 3.88 |
| 1/12/1983  | 5/9/1983   | 15.50 | 3  | 10.65 | 4.85 |
| 12/22/1982 | 5/11/1983  | 16.46 | 4  | 10.61 | 5.85 |
| 7/7/1982   | 5/23/1983  | 14.90 | 10 | 11.24 | 3.66 |
| 7/9/1982   | 5/25/1983  | 15.50 | 10 | 11.21 | 4.29 |
| 12/29/1981 | 5/27/1983  | 15.00 | 17 | 12.15 | 2.85 |
| 11/16/1982 | 5/31/1983  | 15.50 | 6  | 10.61 | 4.89 |
| 7/7/1982   | 5/31/1983  | 14.00 | 10 | 11.23 | 2.77 |
| 6/18/1982  | 6/2/1983   | 14.50 | 11 | 11.37 | 3.13 |
| 7/30/1982  | 6/17/1983  | 15.03 | 10 | 11.04 | 3.99 |
| 12/6/1982  | 7/1/1983   | 14.80 | 6  | 10.66 | 4.14 |
| 8/13/1982  | 7/1/1983   | 14.90 | 10 | 10.93 | 3.97 |
| 8/27/1982  | 7/19/1983  | 15.10 | 10 | 10.89 | 4.21 |
| 7/30/1982  | 7/19/1983  | 15.00 | 11 | 11.05 | 3.95 |
| 8/30/1982  | 7/25/1983  | 16.25 | 10 | 10.89 | 5.36 |
| 1/28/1983  | 7/28/1983  | 15.90 | 6  | 10.79 | 5.11 |
| 11/30/1982 | 8/3/1983   | 16.50 | 8  | 10.76 | 5.74 |
| 11/5/1982  | 8/3/1983   | 16.34 | 9  | 10.73 | 5.61 |
| 11/19/1982 | 8/19/1983  | 15.00 | 9  | 10.81 | 4.19 |
| 3/22/1983  | 8/22/1983  | 16.40 | 5  | 10.95 | 5.45 |
| 11/22/1982 | 8/22/1983  | 15.50 | 9  | 10.82 | 4.68 |
| 1/10/1983  | 8/31/1983  | 14.75 | 7  | 10.92 | 3.83 |
| 7/15/1983  | 9/7/1983   | 15.00 | 1  | 11.68 | 3.32 |
| 11/26/1982 | 9/14/1983  | 15.78 | 9  | 10.89 | 4.89 |
| 7/6/1982   | 9/16/1983  | 15.00 | 14 | 11.28 | 3.72 |
| 2/11/1983  | 9/19/1983  | 14.50 | 7  | 10.99 | 3.51 |
| 3/3/1983   | 9/20/1983  | 16.50 | 6  | 11.02 | 5.48 |
| 3/7/1983   | 9/29/1983  | 15.50 | 6  | 11.05 | 4.45 |
| 8/27/1982  | 9/30/1983  | 16.15 | 13 | 11.03 | 5.12 |
| 3/1/1983   | 9/30/1983  | 15.25 | 7  | 11.04 | 4.21 |
| 12/17/1982 | 10/4/1983  | 14.80 | 9  | 10.96 | 3.84 |
| 5/10/1983  | 10/7/1983  | 16.00 | 5  | 11.29 | 4.71 |
| 11/19/1982 | 10/18/1983 | 14.50 | 11 | 10.94 | 3.56 |
| 1/21/1983  | 10/19/1983 | 16.50 | 9  | 11.04 | 5.46 |
| 1/21/1983  | 10/19/1983 | 16.25 | 9  | 11.04 | 5.21 |
| 1/28/1983  | 10/27/1983 | 15.20 | 9  | 11.07 | 4.13 |
| 8/16/1983  | 11/10/1983 | 14.35 | 2  | 11.62 | 2.73 |
| 8/31/1983  | 11/23/1983 | 16.00 | 2  | 11.63 | 4.37 |
| 2/23/1983  | 11/23/1983 | 16.15 | 9  | 11.14 | 5.01 |
| 8/29/1983  | 11/30/1983 | 15.00 | 3  | 11.63 | 3.37 |
| 2/7/1983   | 12/5/1983  | 15.25 | 10 | 11.15 | 4.10 |
| 3/7/1983   | 12/6/1983  | 15.07 | 9  | 11.19 | 3.88 |
| 7/15/1983  | 12/8/1983  | 15.90 | 4  | 11.65 | 4.25 |
| 1/21/1983  | 12/9/1983  | 14.75 | 10 | 11.15 | 3.60 |
| 12/10/1982 | 12/12/1983 | 14.50 | 12 | 11.08 | 3.42 |
| 6/9/1983   | 12/15/1983 | 15.56 | 6  | 11.54 | 4.02 |

|            |            |       |    |       |      |
|------------|------------|-------|----|-------|------|
| 5/27/1983  | 12/19/1983 | 14.80 | 6  | 11.51 | 3.29 |
| 3/31/1983  | 12/20/1983 | 14.69 | 8  | 11.28 | 3.41 |
| 6/10/1983  | 12/20/1983 | 16.25 | 6  | 11.55 | 4.70 |
| 2/1/1983   | 12/22/1983 | 14.75 | 10 | 11.19 | 3.56 |
| 7/5/1983   | 1/3/1984   | 14.75 | 6  | 11.66 | 3.09 |
| 2/16/1983  | 1/10/1984  | 15.90 | 10 | 11.23 | 4.67 |
| 7/15/1983  | 1/12/1984  | 15.60 | 6  | 11.69 | 3.91 |
| 3/18/1983  | 1/18/1984  | 13.75 | 10 | 11.30 | 2.45 |
| 4/6/1983   | 1/19/1984  | 15.90 | 9  | 11.34 | 4.56 |
| 7/15/1983  | 1/31/1984  | 15.25 | 6  | 11.69 | 3.56 |
| 5/4/1983   | 2/1/1984   | 14.80 | 9  | 11.46 | 3.34 |
| 4/6/1983   | 2/6/1984   | 14.75 | 10 | 11.37 | 3.38 |
| 4/26/1983  | 2/9/1984   | 15.25 | 9  | 11.44 | 3.81 |
| 1/25/1983  | 2/20/1984  | 15.00 | 13 | 11.27 | 3.73 |
| 1/28/1983  | 2/20/1984  | 15.00 | 12 | 11.27 | 3.73 |
| 9/2/1983   | 2/22/1984  | 14.75 | 5  | 11.71 | 3.04 |
| 5/27/1983  | 2/28/1984  | 14.50 | 9  | 11.59 | 2.91 |
| 9/6/1983   | 3/2/1984   | 14.25 | 5  | 11.74 | 2.51 |
| 4/29/1983  | 3/20/1984  | 16.00 | 10 | 11.54 | 4.46 |
| 7/1/1983   | 3/23/1984  | 15.50 | 8  | 11.76 | 3.74 |
| 7/13/1983  | 4/11/1984  | 15.72 | 9  | 11.83 | 3.89 |
| 4/29/1983  | 4/17/1984  | 15.00 | 11 | 11.62 | 3.38 |
| 5/27/1983  | 4/18/1984  | 16.20 | 10 | 11.73 | 4.47 |
| 11/23/1983 | 5/16/1984  | 15.00 | 5  | 12.20 | 2.80 |
| 5/15/1984  | 5/29/1984  | 15.10 | 0  | 13.58 | 1.52 |
| 11/30/1983 | 6/13/1984  | 15.25 | 6  | 12.40 | 2.85 |
| 1/25/1984  | 6/22/1984  | 16.25 | 4  | 12.68 | 3.57 |
| 12/16/1983 | 6/29/1984  | 15.25 | 6  | 12.54 | 2.71 |
| 8/19/1983  | 7/10/1984  | 16.00 | 10 | 12.25 | 3.75 |
| 10/7/1983  | 7/12/1984  | 16.50 | 9  | 12.38 | 4.12 |
| 9/12/1983  | 7/17/1984  | 14.14 | 10 | 12.31 | 1.83 |
| 1/13/1984  | 7/18/1984  | 15.30 | 6  | 12.71 | 2.59 |
| 9/19/1983  | 7/19/1984  | 14.30 | 10 | 12.33 | 1.97 |
| 10/12/1983 | 7/24/1984  | 16.79 | 9  | 12.42 | 4.37 |
| 1/17/1984  | 7/31/1984  | 16.00 | 6  | 12.74 | 3.26 |
| 10/14/1983 | 8/17/1984  | 14.30 | 10 | 12.44 | 1.86 |
| 1/5/1984   | 9/6/1984   | 16.00 | 8  | 12.66 | 3.34 |
| 12/12/1983 | 9/17/1984  | 17.38 | 9  | 12.58 | 4.80 |
| 8/10/1984  | 9/28/1984  | 16.25 | 1  | 12.37 | 3.88 |
| 12/5/1983  | 9/28/1984  | 15.00 | 9  | 12.55 | 2.45 |
| 12/30/1983 | 10/9/1984  | 14.75 | 9  | 12.60 | 2.15 |
| 3/9/1984   | 10/12/1984 | 15.60 | 7  | 12.82 | 2.78 |
| 11/23/1983 | 10/22/1984 | 15.00 | 11 | 12.49 | 2.51 |
| 4/19/1984  | 10/26/1984 | 16.40 | 6  | 12.81 | 3.59 |
| 5/1/1984   | 10/31/1984 | 16.25 | 6  | 12.78 | 3.47 |
| 4/27/1984  | 11/7/1984  | 15.60 | 6  | 12.74 | 2.86 |
| 6/24/1984  | 11/9/1984  | 16.00 | 4  | 12.47 | 3.53 |
| 3/6/1984   | 11/20/1984 | 15.92 | 8  | 12.65 | 3.27 |
| 6/15/1984  | 12/4/1984  | 16.50 | 5  | 12.39 | 4.11 |
| 7/2/1984   | 12/18/1984 | 16.40 | 5  | 12.22 | 4.18 |

|            |            |       |    |       |      |
|------------|------------|-------|----|-------|------|
| 6/1/1984   | 12/19/1984 | 14.75 | 6  | 12.39 | 2.36 |
| 4/18/1984  | 12/20/1984 | 16.00 | 8  | 12.54 | 3.46 |
| 2/3/1984   | 1/3/1985   | 14.75 | 11 | 12.44 | 2.31 |
| 5/4/1984   | 1/10/1985  | 15.75 | 8  | 12.44 | 3.31 |
| 6/15/1984  | 1/11/1985  | 16.30 | 7  | 12.23 | 4.07 |
| 1/27/1984  | 1/23/1985  | 15.80 | 12 | 12.38 | 3.42 |
| 4/27/1984  | 1/24/1985  | 15.82 | 9  | 12.41 | 3.41 |
| 4/27/1984  | 1/25/1985  | 16.75 | 9  | 12.40 | 4.35 |
| 5/4/1984   | 1/30/1985  | 14.90 | 9  | 12.37 | 2.53 |
| 4/13/1984  | 1/31/1985  | 14.75 | 9  | 12.39 | 2.36 |
| 5/4/1984   | 3/1/1985   | 13.84 | 10 | 12.30 | 1.54 |
| 4/3/1984   | 3/8/1985   | 16.85 | 11 | 12.33 | 4.52 |
| 4/20/1984  | 3/14/1985  | 15.50 | 10 | 12.30 | 3.20 |
| 10/16/1984 | 3/15/1985  | 15.62 | 5  | 11.52 | 4.10 |
| 3/9/1984   | 4/3/1985   | 14.60 | 13 | 12.30 | 2.30 |
| 5/18/1984  | 4/9/1985   | 15.50 | 10 | 12.19 | 3.31 |
| 5/23/1984  | 4/16/1985  | 15.70 | 10 | 12.15 | 3.55 |
| 7/19/1984  | 4/22/1985  | 14.00 | 9  | 11.85 | 2.15 |
| 7/27/1984  | 4/26/1985  | 15.50 | 9  | 11.80 | 3.70 |
| 7/5/1984   | 5/2/1985   | 14.68 | 10 | 11.90 | 2.78 |
| 7/13/1984  | 5/29/1985  | 14.61 | 10 | 11.79 | 2.82 |
| 8/17/1984  | 7/9/1985   | 15.00 | 10 | 11.49 | 3.51 |
| 6/15/1984  | 7/26/1985  | 14.50 | 13 | 11.70 | 2.80 |
| 9/7/1984   | 8/2/1985   | 14.80 | 10 | 11.35 | 3.45 |
| 11/30/1984 | 8/28/1985  | 15.50 | 9  | 11.10 | 4.40 |
| 11/9/1984  | 9/9/1985   | 14.90 | 10 | 11.10 | 3.80 |
| 2/11/1985  | 9/9/1985   | 14.60 | 7  | 10.95 | 3.65 |
| 2/15/1985  | 9/17/1985  | 14.90 | 7  | 10.93 | 3.97 |
| 3/29/1985  | 9/23/1985  | 15.00 | 5  | 10.78 | 4.22 |
| 4/9/1985   | 10/2/1985  | 14.75 | 5  | 10.72 | 4.03 |
| 11/26/1984 | 10/2/1985  | 14.00 | 10 | 11.04 | 2.96 |
| 4/10/1985  | 10/3/1985  | 15.25 | 5  | 10.71 | 4.54 |
| 1/24/1985  | 10/24/1985 | 15.85 | 9  | 10.90 | 4.95 |
| 1/24/1985  | 10/24/1985 | 15.82 | 9  | 10.90 | 4.92 |
| 2/15/1985  | 10/28/1985 | 16.00 | 8  | 10.86 | 5.14 |
| 1/3/1985   | 10/29/1985 | 16.65 | 9  | 10.93 | 5.72 |
| 5/17/1985  | 10/31/1985 | 15.06 | 5  | 10.53 | 4.53 |
| 5/3/1985   | 11/7/1985  | 15.50 | 6  | 10.57 | 4.93 |
| 4/15/1985  | 11/8/1985  | 14.30 | 6  | 10.64 | 3.66 |
| 8/7/1984   | 12/12/1985 | 14.75 | 16 | 11.15 | 3.60 |
| 8/28/1984  | 12/18/1985 | 15.00 | 15 | 11.07 | 3.93 |
| 2/8/1985   | 12/20/1985 | 14.50 | 10 | 10.70 | 3.80 |
| 3/1/1985   | 12/20/1985 | 14.50 | 9  | 10.67 | 3.83 |
| 2/27/1985  | 1/24/1986  | 15.40 | 11 | 10.55 | 4.85 |
| 6/24/1985  | 1/31/1986  | 15.00 | 7  | 10.17 | 4.83 |
| 3/18/1985  | 2/11/1986  | 12.50 | 11 | 10.43 | 2.07 |
| 5/3/1985   | 2/18/1986  | 16.00 | 9  | 10.21 | 5.79 |
| 4/24/1985  | 2/24/1986  | 14.50 | 10 | 10.23 | 4.27 |
| 3/18/1985  | 2/26/1986  | 14.00 | 11 | 10.36 | 3.64 |
| 7/9/1985   | 3/5/1986   | 14.90 | 7  | 9.97  | 4.93 |

|            |            |       |    |       |      |
|------------|------------|-------|----|-------|------|
| 6/3/1985   | 3/11/1986  | 14.50 | 9  | 9.99  | 4.51 |
| 4/19/1985  | 3/12/1986  | 13.50 | 10 | 10.13 | 3.37 |
| 4/26/1985  | 3/27/1986  | 14.10 | 11 | 10.00 | 4.10 |
| 6/18/1985  | 4/4/1986   | 15.00 | 9  | 9.78  | 5.22 |
| 9/10/1985  | 4/14/1986  | 13.40 | 7  | 9.39  | 4.01 |
| 8/14/1985  | 5/16/1986  | 14.50 | 9  | 9.24  | 5.26 |
| 10/25/1985 | 5/29/1986  | 13.90 | 7  | 8.71  | 5.19 |
| 7/12/1985  | 5/30/1986  | 15.10 | 10 | 9.32  | 5.78 |
| 11/25/1985 | 6/11/1986  | 14.00 | 6  | 8.44  | 5.56 |
| 7/2/1985   | 6/24/1986  | 16.63 | 11 | 9.23  | 7.40 |
| 12/17/1985 | 6/26/1986  | 12.00 | 6  | 8.20  | 3.80 |
| 7/15/1985  | 7/10/1986  | 14.34 | 12 | 9.10  | 5.24 |
| 5/12/1986  | 7/11/1986  | 12.75 | 2  | 7.48  | 5.27 |
| 8/28/1985  | 7/17/1986  | 12.40 | 10 | 8.84  | 3.56 |
| 10/18/1985 | 7/25/1986  | 14.25 | 9  | 8.48  | 5.77 |
| 7/3/1985   | 8/6/1986   | 13.50 | 13 | 9.01  | 4.49 |
| 12/30/1985 | 8/14/1986  | 13.50 | 7  | 7.95  | 5.55 |
| 9/13/1985  | 9/16/1986  | 12.75 | 12 | 8.53  | 4.22 |
| 12/17/1985 | 9/19/1986  | 13.25 | 9  | 7.95  | 5.30 |
| 5/24/1985  | 10/1/1986  | 14.00 | 16 | 8.95  | 5.05 |
| 3/27/1986  | 10/3/1986  | 13.40 | 6  | 7.44  | 5.96 |
| 10/22/1986 | 10/31/1986 | 13.50 | 0  | 7.70  | 5.80 |
| 5/5/1986   | 11/5/1986  | 13.00 | 6  | 7.49  | 5.51 |
| 6/20/1986  | 12/3/1986  | 12.90 | 5  | 7.47  | 5.43 |
| 3/18/1986  | 12/4/1986  | 14.44 | 8  | 7.49  | 6.95 |
| 2/5/1986   | 12/16/1986 | 13.60 | 10 | 7.63  | 5.97 |
| 3/3/1986   | 12/30/1986 | 13.00 | 10 | 7.51  | 5.49 |
| 4/11/1986  | 1/12/1987  | 12.40 | 9  | 7.46  | 4.94 |
| 2/13/1986  | 1/27/1987  | 12.71 | 11 | 7.56  | 5.15 |
| 5/1/1986   | 3/2/1987   | 12.47 | 10 | 7.47  | 5.00 |
| 9/5/1986   | 3/3/1987   | 13.60 | 5  | 7.52  | 6.08 |
| 6/1/1986   | 3/10/1987  | 13.50 | 9  | 7.47  | 6.03 |
| 4/18/1986  | 3/13/1987  | 13.00 | 10 | 7.47  | 5.53 |
| 1/5/1987   | 3/31/1987  | 13.00 | 2  | 7.49  | 5.51 |
| 12/13/1984 | 4/6/1987   | 13.00 | 28 | 9.08  | 3.92 |
| 11/10/1986 | 5/5/1987   | 12.85 | 5  | 7.63  | 5.22 |
| 11/10/1986 | 5/12/1987  | 12.65 | 6  | 7.67  | 4.98 |
| 10/10/1986 | 5/28/1987  | 13.50 | 7  | 7.76  | 5.74 |
| 8/22/1986  | 6/15/1987  | 13.20 | 9  | 7.78  | 5.42 |
| 12/17/1986 | 6/30/1987  | 12.50 | 6  | 7.97  | 4.53 |
| 4/6/1987   | 7/8/1987   | 12.00 | 3  | 8.55  | 3.45 |
| 4/26/1986  | 7/10/1987  | 12.90 | 14 | 7.72  | 5.18 |
| 6/20/1986  | 7/16/1987  | 13.50 | 13 | 7.76  | 5.74 |
| 6/29/1987  | 7/27/1987  | 13.00 | 0  | 8.57  | 4.43 |
| 8/28/1986  | 7/27/1987  | 13.40 | 11 | 7.88  | 5.52 |
| 1/23/1987  | 7/27/1987  | 13.50 | 6  | 8.17  | 5.33 |
| 2/25/1987  | 7/31/1987  | 12.98 | 5  | 8.32  | 4.66 |
| 1/6/1987   | 8/26/1987  | 12.63 | 7  | 8.21  | 4.42 |
| 2/27/1987  | 8/26/1987  | 12.75 | 6  | 8.42  | 4.33 |
| 3/6/1987   | 8/27/1987  | 13.25 | 5  | 8.47  | 4.78 |

|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 5/13/1986  | 9/9/1987   | 13.00 | 16 | 7.88 | 5.12 |
| 11/7/1986  | 10/2/1987  | 11.50 | 10 | 8.23 | 3.27 |
| 3/6/1987   | 10/15/1987 | 13.00 | 7  | 8.72 | 4.28 |
| 1/30/1987  | 11/2/1987  | 13.00 | 9  | 8.60 | 4.40 |
| 10/30/1987 | 11/19/1987 | 13.00 | 0  | 8.92 | 4.08 |
| 5/19/1987  | 11/30/1987 | 12.00 | 6  | 9.02 | 2.98 |
| 11/26/1986 | 12/3/1987  | 14.20 | 12 | 8.42 | 5.78 |
| 8/26/1986  | 12/15/1987 | 13.25 | 15 | 8.29 | 4.96 |
| 11/17/1986 | 12/16/1987 | 13.72 | 13 | 8.43 | 5.29 |
| 3/6/1987   | 12/18/1987 | 13.50 | 9  | 8.80 | 4.70 |
| 4/24/1987  | 12/21/1987 | 12.01 | 8  | 9.00 | 3.01 |
| 6/1/1987   | 12/22/1987 | 12.00 | 6  | 9.05 | 2.95 |
| 5/1/1987   | 12/22/1987 | 13.00 | 7  | 9.02 | 3.98 |
| 2/23/1987  | 1/20/1988  | 13.80 | 11 | 8.76 | 5.04 |
| 6/8/1987   | 1/26/1988  | 13.90 | 7  | 9.04 | 4.86 |
| 6/19/1987  | 1/29/1988  | 13.20 | 7  | 9.06 | 4.14 |
| 8/8/1987   | 2/4/1988   | 12.60 | 6  | 9.15 | 3.45 |
| 7/31/1987  | 3/24/1988  | 11.24 | 7  | 9.00 | 2.24 |
| 4/6/1987   | 3/30/1988  | 12.72 | 11 | 8.86 | 3.86 |
| 12/18/1985 | 4/1/1988   | 12.50 | 27 | 8.24 | 4.26 |
| 10/9/1987  | 5/11/1988  | 13.50 | 7  | 8.88 | 4.62 |
| 12/17/1987 | 6/30/1988  | 12.75 | 6  | 8.83 | 3.92 |
| 11/20/1987 | 7/1/1988   | 12.75 | 7  | 8.87 | 3.88 |
| 8/21/1987  | 7/20/1988  | 13.40 | 11 | 9.02 | 4.38 |
| 3/1/1988   | 8/29/1988  | 12.75 | 6  | 9.02 | 3.73 |
| 8/11/1987  | 8/30/1988  | 13.50 | 12 | 9.04 | 4.46 |
| 2/29/1988  | 10/13/1988 | 13.10 | 7  | 9.01 | 4.09 |
| 1/4/1988   | 12/20/1988 | 13.00 | 11 | 8.94 | 4.06 |
| 5/20/1988  | 12/20/1988 | 12.25 | 7  | 9.07 | 3.18 |
| 7/1/1988   | 12/21/1988 | 12.90 | 5  | 9.07 | 3.83 |
| 6/10/1987  | 12/27/1988 | 13.00 | 18 | 8.99 | 4.01 |
| 5/2/1988   | 12/28/1988 | 13.10 | 8  | 9.08 | 4.02 |
| 4/15/1988  | 1/27/1989  | 13.00 | 9  | 9.06 | 3.94 |
| 7/15/1988  | 1/31/1989  | 13.00 | 6  | 9.05 | 3.95 |
| 2/19/1988  | 3/1/1989   | 12.76 | 12 | 8.98 | 3.78 |
| 4/11/1988  | 3/8/1989   | 13.00 | 11 | 9.05 | 3.95 |
| 11/19/1987 | 3/30/1989  | 14.00 | 16 | 8.97 | 5.03 |
| 4/15/1988  | 4/18/1989  | 13.00 | 12 | 9.06 | 3.94 |
| 10/13/1988 | 5/5/1989   | 12.40 | 6  | 9.00 | 3.40 |
| 9/30/1988  | 6/8/1989   | 13.50 | 8  | 8.96 | 4.54 |
| 12/16/1988 | 6/30/1989  | 13.00 | 6  | 8.86 | 4.14 |
| 6/30/1988  | 8/14/1989  | 12.50 | 13 | 8.87 | 3.63 |
| 11/10/1988 | 10/24/1989 | 12.50 | 11 | 8.63 | 3.87 |
| 12/30/1988 | 11/9/1989  | 13.00 | 10 | 8.53 | 4.47 |
| 5/22/1989  | 12/15/1989 | 13.00 | 6  | 8.10 | 4.90 |
| 3/31/1989  | 12/21/1989 | 12.90 | 8  | 8.26 | 4.64 |
| 6/1/1989   | 12/27/1989 | 13.00 | 6  | 8.06 | 4.94 |
| 6/1/1989   | 12/27/1989 | 12.50 | 6  | 8.06 | 4.44 |
| 12/19/1989 | 1/10/1990  | 12.80 | 0  | 7.98 | 4.82 |
| 5/1/1989   | 1/11/1990  | 12.90 | 8  | 8.15 | 4.75 |

|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 2/17/1989  | 1/17/1990  | 12.80 | 11 | 8.35 | 4.45 |
| 7/14/1989  | 1/26/1990  | 12.00 | 6  | 8.05 | 3.95 |
| 9/15/1989  | 3/30/1990  | 12.90 | 6  | 8.18 | 4.72 |
| 3/31/1989  | 4/4/1990   | 15.76 | 12 | 8.30 | 7.46 |
| 6/12/1989  | 4/12/1990  | 12.52 | 10 | 8.18 | 4.34 |
| 7/21/1989  | 4/19/1990  | 12.75 | 9  | 8.20 | 4.55 |
| 5/26/1989  | 5/21/1990  | 12.10 | 12 | 8.26 | 3.84 |
| 11/17/1989 | 5/29/1990  | 12.40 | 6  | 8.41 | 3.99 |
| 8/15/1989  | 5/31/1990  | 12.00 | 9  | 8.30 | 3.70 |
| 1/29/1990  | 6/4/1990   | 12.90 | 4  | 8.63 | 4.27 |
| 7/13/1989  | 6/6/1990   | 12.25 | 10 | 8.28 | 3.97 |
| 9/29/1989  | 6/15/1990  | 13.20 | 8  | 8.33 | 4.87 |
| 12/29/1989 | 6/27/1990  | 12.90 | 6  | 8.54 | 4.36 |
| 12/15/1989 | 6/29/1990  | 12.50 | 6  | 8.49 | 4.01 |
| 9/1/1989   | 7/6/1990   | 12.35 | 10 | 8.32 | 4.03 |
| 8/15/1989  | 7/6/1990   | 12.10 | 10 | 8.31 | 3.79 |
| 8/1/1989   | 8/16/1990  | 13.21 | 12 | 8.33 | 4.88 |
| 8/24/1989  | 9/26/1990  | 11.45 | 13 | 8.42 | 3.03 |
| 4/2/1990   | 10/2/1990  | 13.00 | 6  | 8.71 | 4.29 |
| 11/17/1989 | 10/5/1990  | 12.84 | 10 | 8.53 | 4.31 |
| 11/17/1989 | 11/21/1990 | 12.70 | 12 | 8.56 | 4.14 |
| 3/15/1990  | 12/13/1990 | 12.30 | 9  | 8.67 | 3.63 |
| 5/21/1990  | 12/17/1990 | 12.87 | 7  | 8.66 | 4.21 |
| 3/30/1990  | 12/18/1990 | 13.10 | 8  | 8.68 | 4.42 |
| 6/26/1990  | 12/19/1990 | 12.00 | 5  | 8.68 | 3.32 |
| 7/3/1990   | 12/20/1990 | 12.75 | 5  | 8.69 | 4.06 |
| 6/29/1990  | 12/21/1990 | 12.50 | 5  | 8.68 | 3.82 |
| 8/31/1990  | 12/27/1990 | 12.79 | 3  | 8.67 | 4.12 |
| 5/1/1990   | 1/2/1991   | 13.10 | 8  | 8.65 | 4.45 |
| 4/20/1990  | 1/4/1991   | 12.50 | 8  | 8.65 | 3.85 |
| 6/1/1990   | 1/15/1991  | 12.75 | 7  | 8.62 | 4.13 |
| 2/27/1990  | 1/25/1991  | 11.70 | 11 | 8.62 | 3.08 |
| 3/22/1990  | 2/4/1991   | 12.50 | 10 | 8.61 | 3.89 |
| 5/31/1990  | 2/14/1991  | 12.72 | 8  | 8.56 | 4.16 |
| 8/24/1990  | 2/22/1991  | 12.80 | 6  | 8.53 | 4.27 |
| 4/12/1990  | 3/8/1991   | 13.00 | 11 | 8.56 | 4.44 |
| 10/9/1989  | 5/7/1991   | 13.50 | 19 | 8.41 | 5.09 |
| 11/1/1990  | 5/30/1991  | 12.75 | 7  | 8.26 | 4.49 |
| 7/31/1990  | 6/12/1991  | 12.00 | 10 | 8.46 | 3.54 |
| 8/3/1990   | 6/25/1991  | 11.70 | 10 | 8.46 | 3.24 |
| 12/15/1990 | 7/1/1991   | 12.00 | 6  | 8.25 | 3.75 |
| 9/27/1990  | 7/3/1991   | 12.50 | 9  | 8.36 | 4.14 |
| 1/7/1991   | 8/1/1991   | 12.90 | 6  | 8.28 | 4.62 |
| 1/16/1990  | 8/16/1991  | 13.20 | 19 | 8.49 | 4.71 |
| 2/15/1991  | 9/27/1991  | 12.50 | 7  | 8.24 | 4.26 |
| 4/2/1991   | 9/30/1991  | 12.25 | 6  | 8.25 | 4.00 |
| 12/28/1990 | 10/23/1991 | 12.50 | 9  | 8.20 | 4.30 |
| 3/8/1991   | 10/31/1991 | 11.80 | 7  | 8.21 | 3.59 |
| 1/4/1991   | 11/1/1991  | 12.00 | 10 | 8.20 | 3.80 |
| 5/17/1991  | 11/5/1991  | 12.25 | 5  | 8.19 | 4.06 |



|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 4/12/1991  | 11/12/1991 | 12.50 | 7  | 8.18 | 4.32 |
| 12/28/1990 | 11/12/1991 | 13.25 | 10 | 8.19 | 5.06 |
| 4/30/1991  | 11/25/1991 | 12.40 | 6  | 8.16 | 4.24 |
| 5/16/1991  | 11/26/1991 | 12.50 | 6  | 8.16 | 4.34 |
| 5/31/1991  | 12/19/1991 | 12.60 | 6  | 8.11 | 4.49 |
| 4/1/1991   | 12/19/1991 | 12.80 | 8  | 8.14 | 4.66 |
| 5/1/1991   | 1/9/1992   | 12.80 | 8  | 8.08 | 4.72 |
| 3/26/1991  | 1/16/1992  | 12.75 | 9  | 8.08 | 4.67 |
| 3/18/1991  | 1/21/1992  | 12.00 | 10 | 8.08 | 3.92 |
| 4/2/1991   | 1/22/1992  | 13.00 | 9  | 8.07 | 4.93 |
| 7/26/1991  | 1/31/1992  | 12.00 | 6  | 7.88 | 4.12 |
| 3/19/1991  | 2/11/1992  | 12.40 | 10 | 8.06 | 4.34 |
| 6/17/1991  | 3/16/1992  | 11.43 | 9  | 7.97 | 3.46 |
| 4/24/1991  | 3/18/1992  | 12.28 | 10 | 8.03 | 4.25 |
| 7/19/1991  | 4/2/1992   | 12.10 | 8  | 7.91 | 4.19 |
| 5/17/1991  | 4/9/1992   | 11.45 | 10 | 8.00 | 3.45 |
| 7/12/1991  | 4/10/1992  | 11.50 | 9  | 7.92 | 3.58 |
| 11/4/1991  | 5/5/1992   | 11.50 | 6  | 7.83 | 3.67 |
| 10/25/1991 | 6/1/1992   | 12.30 | 7  | 7.84 | 4.46 |
| 12/5/1991  | 6/26/1992  | 12.35 | 6  | 7.82 | 4.53 |
| 8/2/1991   | 6/29/1992  | 11.00 | 11 | 7.88 | 3.12 |
| 9/16/1991  | 7/13/1992  | 13.50 | 10 | 7.84 | 5.66 |
| 8/28/1991  | 7/22/1992  | 11.20 | 10 | 7.84 | 3.36 |
| 1/30/1992  | 8/6/1992   | 12.50 | 6  | 7.83 | 4.67 |
| 12/27/1991 | 9/28/1992  | 11.40 | 9  | 7.71 | 3.69 |
| 3/15/1992  | 9/30/1992  | 11.75 | 6  | 7.69 | 4.06 |
| 4/11/1991  | 10/16/1992 | 13.16 | 18 | 7.89 | 5.27 |
| 5/26/1992  | 11/3/1992  | 12.00 | 5  | 7.56 | 4.44 |
| 5/1/1992   | 12/15/1992 | 11.00 | 7  | 7.59 | 3.41 |
| 12/30/1991 | 12/22/1992 | 12.40 | 11 | 7.67 | 4.73 |
| 3/31/1992  | 12/22/1992 | 12.30 | 8  | 7.63 | 4.67 |
| 11/14/1991 | 12/30/1992 | 12.00 | 13 | 7.68 | 4.32 |
| 6/1/1992   | 1/12/1993  | 12.00 | 7  | 7.53 | 4.47 |
| 4/24/1992  | 1/21/1993  | 11.25 | 9  | 7.57 | 3.68 |
| 1/31/1992  | 2/2/1993   | 11.40 | 12 | 7.64 | 3.76 |
| 5/1/1992   | 2/15/1993  | 12.30 | 9  | 7.53 | 4.77 |
| 7/29/1992  | 2/24/1993  | 11.90 | 7  | 7.40 | 4.50 |
| 7/31/1992  | 2/26/1993  | 11.80 | 7  | 7.39 | 4.41 |
| 12/20/1991 | 2/26/1993  | 12.20 | 14 | 7.60 | 4.60 |
| 9/25/1992  | 4/23/1993  | 11.75 | 7  | 7.25 | 4.50 |
| 8/18/1992  | 5/14/1993  | 11.50 | 8  | 7.23 | 4.27 |
| 11/16/1992 | 5/28/1993  | 11.00 | 6  | 7.11 | 3.89 |
| 10/26/1992 | 6/3/1993   | 12.00 | 7  | 7.16 | 4.84 |
| 11/20/1992 | 6/18/1993  | 12.10 | 7  | 7.07 | 5.03 |
| 8/7/1992   | 6/25/1993  | 11.67 | 10 | 7.19 | 4.48 |
| 9/1/1992   | 7/21/1993  | 11.38 | 10 | 7.13 | 4.25 |
| 3/12/1992  | 7/23/1993  | 10.46 | 16 | 7.35 | 3.11 |
| 10/30/1992 | 9/21/1993  | 10.50 | 10 | 6.91 | 3.59 |
| 1/4/1993   | 9/30/1993  | 11.60 | 8  | 6.74 | 4.86 |
| 4/27/1992  | 11/12/1993 | 12.00 | 18 | 7.06 | 4.94 |

|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 1/20/1993  | 11/26/1993 | 11.00 | 10 | 6.59 | 4.41 |
| 3/1/1993   | 12/14/1993 | 10.55 | 9  | 6.49 | 4.06 |
| 11/12/1992 | 12/16/1993 | 10.60 | 13 | 6.72 | 3.88 |
| 3/31/1993  | 12/21/1993 | 11.30 | 8  | 6.45 | 4.85 |
| 7/21/1993  | 1/4/1994   | 10.07 | 5  | 6.18 | 3.89 |
| 1/5/1993   | 1/13/1994  | 11.00 | 12 | 6.58 | 4.42 |
| 7/1/1992   | 1/21/1994  | 11.00 | 18 | 6.87 | 4.13 |
| 5/17/1993  | 2/17/1994  | 10.60 | 9  | 6.35 | 4.25 |
| 3/6/1991   | 2/25/1994  | 12.00 | 36 | 7.37 | 4.63 |
| 11/1/1993  | 3/1/1994   | 11.00 | 4  | 6.31 | 4.69 |
| 5/10/1993  | 5/10/1994  | 11.75 | 12 | 6.52 | 5.23 |
| 10/1/1993  | 5/13/1994  | 10.50 | 7  | 6.55 | 3.95 |
| 2/15/1994  | 10/31/1994 | 10.00 | 8  | 7.41 | 2.59 |
| 1/18/1994  | 11/9/1994  | 10.85 | 9  | 7.33 | 3.52 |
| 1/14/1994  | 11/9/1994  | 10.85 | 9  | 7.32 | 3.53 |
| 1/12/1994  | 11/28/1994 | 11.06 | 10 | 7.35 | 3.71 |
| 4/14/1994  | 12/8/1994  | 11.70 | 7  | 7.63 | 4.07 |
| 2/4/1994   | 12/8/1994  | 11.50 | 10 | 7.45 | 4.05 |
| 5/16/1994  | 12/14/1994 | 10.95 | 7  | 7.68 | 3.27 |
| 3/31/1994  | 12/15/1994 | 11.50 | 8  | 7.62 | 3.88 |
| 4/15/1994  | 12/19/1994 | 11.50 | 8  | 7.64 | 3.86 |
| 2/10/1994  | 1/9/1995   | 12.28 | 11 | 7.51 | 4.77 |
| 6/30/1994  | 1/31/1995  | 11.00 | 7  | 7.78 | 3.22 |
| 8/31/1993  | 2/17/1995  | 11.90 | 17 | 7.12 | 4.78 |
| 6/22/1994  | 3/9/1995   | 11.50 | 8  | 7.74 | 3.76 |
| 3/17/1994  | 3/20/1995  | 12.00 | 12 | 7.61 | 4.39 |
| 7/6/1994   | 3/23/1995  | 12.81 | 8  | 7.73 | 5.08 |
| 11/8/1993  | 3/29/1995  | 11.60 | 16 | 7.30 | 4.30 |
| 12/30/1993 | 4/7/1995   | 11.00 | 15 | 7.41 | 3.59 |
| 2/4/1994   | 4/19/1995  | 11.00 | 14 | 7.51 | 3.49 |
| 7/8/1994   | 5/12/1995  | 11.63 | 10 | 7.66 | 3.97 |
| 8/17/1994  | 5/25/1995  | 11.20 | 9  | 7.65 | 3.55 |
| 9/26/1994  | 6/9/1995   | 11.25 | 8  | 7.59 | 3.66 |
| 5/16/1994  | 6/21/1995  | 12.25 | 13 | 7.53 | 4.72 |
| 9/30/1994  | 6/30/1995  | 11.10 | 9  | 7.51 | 3.59 |
| 3/27/1995  | 9/11/1995  | 11.30 | 5  | 6.88 | 4.42 |
| 12/30/1994 | 9/27/1995  | 11.50 | 9  | 7.10 | 4.40 |
| 3/3/1994   | 9/27/1995  | 11.75 | 19 | 7.34 | 4.41 |
| 6/1/1995   | 9/27/1995  | 11.30 | 3  | 6.68 | 4.62 |
| 3/15/1995  | 9/29/1995  | 11.00 | 6  | 6.88 | 4.12 |
| 1/31/1995  | 11/9/1995  | 12.36 | 9  | 6.91 | 5.45 |
| 3/1/1995   | 11/17/1995 | 11.00 | 8  | 6.81 | 4.19 |
| 11/10/1994 | 2/5/1996   | 12.25 | 15 | 6.93 | 5.32 |
| 6/13/1995  | 3/29/1996  | 10.67 | 9  | 6.42 | 4.25 |
| 4/17/1995  | 4/11/1996  | 12.59 | 12 | 6.52 | 6.07 |
| 4/17/1995  | 4/11/1996  | 12.59 | 12 | 6.52 | 6.07 |
| 12/5/1995  | 4/24/1996  | 11.25 | 4  | 6.34 | 4.91 |
| 9/15/1995  | 5/23/1996  | 11.25 | 8  | 6.41 | 4.84 |
| 5/15/1995  | 9/27/1996  | 11.00 | 16 | 6.63 | 4.37 |
| 8/2/1996   | 11/5/1996  | 11.00 | 3  | 6.88 | 4.12 |

|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 3/15/1996  | 11/26/1996 | 11.30 | 8  | 6.86 | 4.44 |
| 3/27/1996  | 12/31/1996 | 11.50 | 9  | 6.83 | 4.67 |
| 9/13/1995  | 1/3/1997   | 10.70 | 15 | 6.60 | 4.10 |
| 1/16/1996  | 2/13/1997  | 11.80 | 13 | 6.73 | 5.07 |
| 4/1/1996   | 2/20/1997  | 11.80 | 10 | 6.82 | 4.98 |
| 4/1/1996   | 4/29/1997  | 11.70 | 13 | 6.85 | 4.85 |
| 9/3/1996   | 7/17/1997  | 12.00 | 10 | 6.80 | 5.20 |
| 5/22/1996  | 12/23/1997 | 11.12 | 19 | 6.70 | 4.42 |
| 6/16/1997  | 3/2/1998   | 11.25 | 8  | 6.24 | 5.01 |
| 3/21/1997  | 3/6/1998   | 10.75 | 11 | 6.42 | 4.33 |
| 11/12/1996 | 3/20/1998  | 10.50 | 16 | 6.47 | 4.03 |
| 11/27/1996 | 7/10/1998  | 11.40 | 19 | 6.35 | 5.05 |
| 11/14/1997 | 9/15/1998  | 11.90 | 10 | 5.80 | 6.10 |
| 11/3/1997  | 11/30/1998 | 12.60 | 13 | 5.69 | 6.91 |
| 6/1/1998   | 2/5/1999   | 10.30 | 8  | 5.32 | 4.98 |
| 12/18/1998 | 7/29/1999  | 10.75 | 7  | 5.61 | 5.14 |
| 5/24/1999  | 9/23/1999  | 10.75 | 4  | 6.02 | 4.73 |
| 10/12/1998 | 1/7/2000   | 11.50 | 15 | 5.75 | 5.75 |
| 10/28/1998 | 1/7/2000   | 11.50 | 14 | 5.77 | 5.73 |
| 7/26/1999  | 3/28/2000  | 11.25 | 8  | 6.22 | 5.03 |
| 9/20/1999  | 5/24/2000  | 11.00 | 8  | 6.20 | 4.80 |
| 10/22/1999 | 9/29/2000  | 11.16 | 11 | 6.07 | 5.09 |
| 3/31/2000  | 11/30/2000 | 12.10 | 8  | 5.86 | 6.24 |
| 11/27/2000 | 7/25/2001  | 11.02 | 8  | 5.57 | 5.45 |
| 11/27/2000 | 7/25/2001  | 11.02 | 8  | 5.57 | 5.45 |
| 12/18/2000 | 7/31/2001  | 11.00 | 7  | 5.57 | 5.43 |
| 10/2/2000  | 8/31/2001  | 10.50 | 11 | 5.60 | 4.90 |
| 11/1/2000  | 9/7/2001   | 10.75 | 10 | 5.57 | 5.18 |
| 11/3/2000  | 9/20/2001  | 10.00 | 10 | 5.57 | 4.43 |
| 8/3/2001   | 12/3/2001  | 12.88 | 4  | 5.34 | 7.54 |
| 6/29/2001  | 12/20/2001 | 12.50 | 5  | 5.41 | 7.09 |
| 7/3/2001   | 1/22/2002  | 10.00 | 6  | 5.41 | 4.59 |
| 10/1/2001  | 3/27/2002  | 10.10 | 5  | 5.40 | 4.70 |
| 9/7/2001   | 4/22/2002  | 11.80 | 7  | 5.44 | 6.36 |
| 11/30/2001 | 5/28/2002  | 10.17 | 5  | 5.55 | 4.62 |
| 9/10/2001  | 6/10/2002  | 12.00 | 9  | 5.48 | 6.52 |
| 10/31/2001 | 7/15/2002  | 11.00 | 8  | 5.49 | 5.51 |
| 7/26/2001  | 12/4/2002  | 11.55 | 16 | 5.33 | 6.22 |
| 8/16/2002  | 12/13/2002 | 11.75 | 3  | 4.91 | 6.84 |
| 8/2/2002   | 12/20/2002 | 11.40 | 4  | 4.93 | 6.47 |
| 5/31/2001  | 1/8/2003   | 11.10 | 19 | 5.34 | 5.76 |
| 8/6/2002   | 1/31/2003  | 12.45 | 5  | 4.92 | 7.53 |
| 5/1/2002   | 2/28/2003  | 12.30 | 10 | 5.09 | 7.21 |
| 5/7/2002   | 3/6/2003   | 10.75 | 10 | 5.08 | 5.67 |
| 3/28/2002  | 3/20/2003  | 12.00 | 11 | 5.13 | 6.87 |
| 5/7/2002   | 4/3/2003   | 12.00 | 11 | 5.06 | 6.94 |
| 10/15/2002 | 6/25/2003  | 10.75 | 8  | 4.80 | 5.95 |
| 5/31/2002  | 6/26/2003  | 10.75 | 13 | 4.92 | 5.83 |
| 3/18/2003  | 8/26/2003  | 10.50 | 5  | 4.80 | 5.70 |
| 7/31/2003  | 12/17/2003 | 10.70 | 4  | 5.17 | 5.53 |

|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 5/30/2003  | 12/18/2003 | 11.50 | 6  | 5.01 | 6.49 |
| 3/6/2003   | 12/19/2003 | 12.00 | 9  | 4.93 | 7.07 |
| 4/1/2003   | 12/19/2003 | 12.00 | 8  | 4.94 | 7.06 |
| 5/30/2003  | 1/13/2004  | 12.00 | 7  | 5.01 | 6.99 |
| 5/27/2003  | 3/2/2004   | 10.75 | 9  | 4.98 | 5.77 |
| 10/1/2003  | 3/26/2004  | 10.25 | 5  | 5.00 | 5.25 |
| 12/30/2002 | 5/18/2004  | 10.50 | 16 | 4.94 | 5.56 |
| 10/16/2003 | 5/25/2004  | 10.25 | 7  | 5.05 | 5.20 |
| 12/1/2003  | 5/27/2004  | 10.25 | 5  | 5.04 | 5.21 |
| 11/8/2002  | 6/2/2004   | 11.22 | 19 | 4.95 | 6.27 |
| 12/29/2003 | 6/30/2004  | 10.50 | 6  | 5.10 | 5.40 |
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| 5/3/2002   | 7/16/2004  | 11.60 | 26 | 5.03 | 6.57 |
| 12/29/2003 | 8/25/2004  | 10.25 | 8  | 5.11 | 5.14 |
| 2/6/2004   | 9/9/2004   | 10.40 | 7  | 5.12 | 5.28 |
| 7/1/2004   | 12/21/2004 | 11.25 | 5  | 4.97 | 6.28 |
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| 5/5/2004   | 12/22/2004 | 11.50 | 7  | 5.08 | 6.42 |
| 7/1/2004   | 1/6/2005   | 10.70 | 6  | 4.96 | 5.74 |
| 4/5/2004   | 2/18/2005  | 10.30 | 10 | 5.01 | 5.29 |
| 8/4/2004   | 2/25/2005  | 10.50 | 6  | 4.83 | 5.67 |
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| 7/15/2004  | 4/4/2005   | 10.00 | 8  | 4.85 | 5.15 |
| 6/27/2003  | 4/7/2005   | 10.25 | 21 | 5.00 | 5.25 |
| 11/30/2004 | 5/25/2005  | 10.75 | 5  | 4.69 | 6.06 |
| 9/17/2004  | 7/19/2005  | 11.50 | 10 | 4.66 | 6.84 |
| 2/24/2004  | 8/5/2005   | 11.75 | 17 | 4.84 | 6.91 |
| 11/15/2004 | 9/28/2005  | 10.00 | 10 | 4.58 | 5.42 |
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| 5/20/2005  | 12/13/2005 | 10.75 | 6  | 4.51 | 6.24 |
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| 12/17/2004 | 12/22/2005 | 11.15 | 12 | 4.58 | 6.57 |
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| 6/1/2005   | 1/5/2006   | 11.00 | 7  | 4.52 | 6.48 |
| 5/5/2005   | 4/17/2006  | 10.20 | 11 | 4.57 | 5.63 |
| 10/3/2005  | 4/26/2006  | 10.60 | 6  | 4.71 | 5.89 |
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| 2/23/2006  | 9/14/2006  | 10.00 | 6  | 5.02 | 4.98 |
| 4/14/2006  | 12/1/2006  | 10.50 | 7  | 4.99 | 5.51 |
| 5/15/2006  | 12/7/2006  | 10.75 | 6  | 4.95 | 5.80 |
| 2/1/2006   | 12/21/2006 | 10.90 | 10 | 4.91 | 5.99 |
| 1/31/2006  | 12/21/2006 | 11.25 | 10 | 4.91 | 6.34 |
| 7/28/2006  | 1/5/2007   | 10.00 | 5  | 4.82 | 5.18 |
| 3/31/2006  | 1/11/2007  | 10.90 | 9  | 4.95 | 5.95 |
| 3/13/2006  | 1/12/2007  | 10.10 | 10 | 4.94 | 5.16 |
| 2/15/2006  | 1/13/2007  | 10.40 | 11 | 4.91 | 5.49 |
| 3/17/2006  | 1/19/2007  | 10.80 | 10 | 4.94 | 5.86 |

|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 7/3/2006   | 5/17/2007  | 10.25 | 10 | 4.84 | 5.41 |
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| 7/26/2006  | 5/22/2007  | 10.50 | 10 | 4.82 | 5.68 |
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| 3/1/2007   | 11/29/2007 | 10.90 | 9  | 4.87 | 6.03 |
| 2/1/2007   | 12/6/2007  | 10.75 | 10 | 4.86 | 5.89 |
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| 6/8/2007   | 12/28/2007 | 10.25 | 6  | 4.83 | 5.42 |
| 6/1/2007   | 1/8/2008   | 10.75 | 7  | 4.82 | 5.93 |
| 5/15/2007  | 1/31/2008  | 10.71 | 8  | 4.79 | 5.92 |
| 6/29/2007  | 3/12/2008  | 10.25 | 8  | 4.68 | 5.57 |
| 2/21/2007  | 4/24/2008  | 10.10 | 14 | 4.72 | 5.38 |
| 12/14/2006 | 5/27/2008  | 10.00 | 17 | 4.72 | 5.28 |
| 3/30/2007  | 6/10/2008  | 10.70 | 14 | 4.71 | 5.99 |
| 12/3/2007  | 6/27/2008  | 11.04 | 6  | 4.49 | 6.55 |
| 10/1/2007  | 7/30/2008  | 10.80 | 10 | 4.53 | 6.27 |
| 12/17/2007 | 8/11/2008  | 10.25 | 7  | 4.51 | 5.74 |
| 7/30/2007  | 8/26/2008  | 10.18 | 13 | 4.59 | 5.59 |
| 4/3/2008   | 9/30/2008  | 10.20 | 6  | 4.51 | 5.69 |
| 12/3/2007  | 10/8/2008  | 10.15 | 10 | 4.47 | 5.68 |
| 1/31/2008  | 11/13/2008 | 10.55 | 9  | 4.44 | 6.11 |
| 7/2/2007   | 12/1/2008  | 10.25 | 17 | 4.53 | 5.72 |
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| 2/27/2008  | 12/29/2008 | 10.00 | 10 | 4.25 | 5.75 |
| 3/4/2008   | 12/29/2008 | 10.20 | 10 | 4.25 | 5.95 |
| 7/11/2008  | 1/14/2009  | 10.50 | 6  | 3.94 | 6.56 |
| 4/4/2008   | 1/27/2009  | 10.76 | 9  | 4.11 | 6.65 |
| 6/27/2008  | 1/30/2009  | 10.50 | 7  | 3.92 | 6.58 |
| 1/31/2008  | 3/4/2009   | 10.50 | 13 | 4.12 | 6.38 |
| 7/31/2008  | 4/2/2009   | 11.10 | 8  | 3.76 | 7.34 |
| 7/17/2008  | 4/21/2009  | 10.61 | 9  | 3.80 | 6.81 |
| 9/22/2008  | 5/28/2009  | 10.50 | 8  | 3.68 | 6.82 |
| 12/1/2008  | 6/24/2009  | 10.80 | 6  | 3.64 | 7.16 |
| 1/23/2009  | 7/17/2009  | 10.50 | 5  | 3.97 | 6.53 |
| 7/14/2008  | 10/14/2009 | 10.70 | 15 | 4.00 | 6.70 |
| 8/1/2008   | 11/3/2009  | 10.70 | 15 | 3.98 | 6.72 |
| 2/19/2009  | 11/24/2009 | 10.25 | 9  | 4.16 | 6.09 |
| 6/2/2009   | 12/7/2009  | 10.70 | 6  | 4.33 | 6.37 |
| 6/26/2009  | 12/16/2009 | 10.90 | 5  | 4.30 | 6.60 |
| 3/13/2009  | 12/18/2009 | 10.40 | 9  | 4.22 | 6.18 |
| 5/8/2009   | 12/18/2009 | 10.40 | 7  | 4.33 | 6.07 |
| 1/23/2009  | 12/22/2009 | 10.20 | 11 | 4.13 | 6.07 |
| 4/29/2009  | 12/22/2009 | 10.40 | 7  | 4.32 | 6.08 |

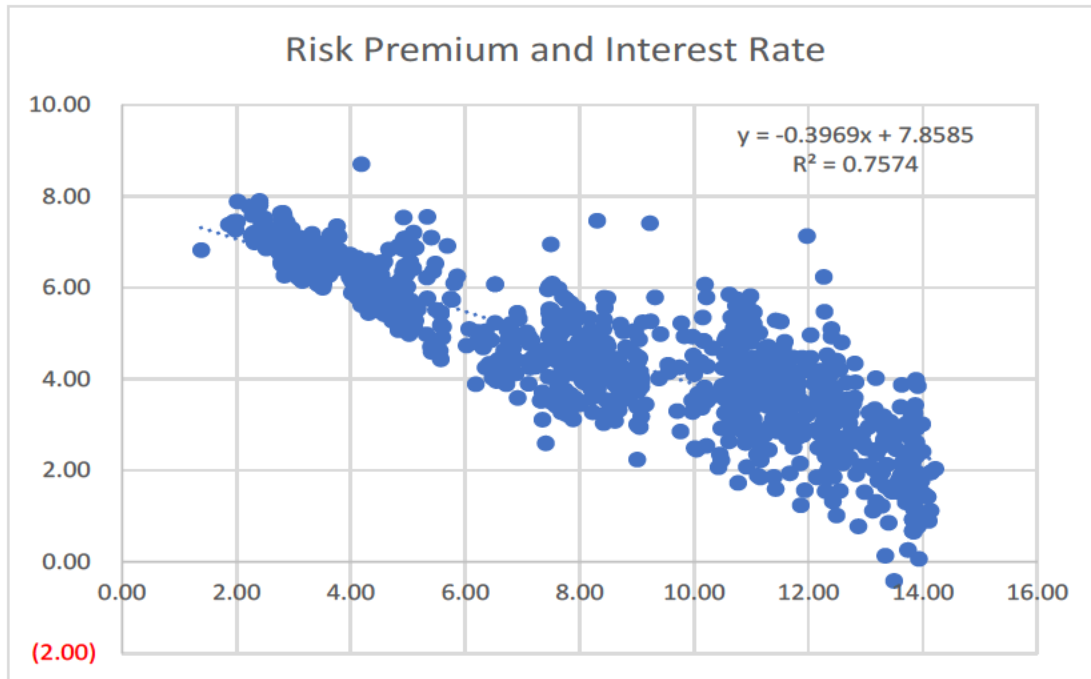
|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 6/1/2009   | 12/22/2009 | 10.40 | 6  | 4.34 | 6.06 |
| 4/2/2009   | 1/26/2010  | 10.13 | 9  | 4.31 | 5.82 |
| 6/2/2009   | 1/27/2010  | 10.40 | 7  | 4.38 | 6.02 |
| 6/2/2009   | 1/27/2010  | 10.40 | 7  | 4.38 | 6.02 |
| 7/27/2009  | 1/27/2010  | 10.70 | 6  | 4.36 | 6.34 |
| 6/23/2009  | 2/18/2010  | 10.60 | 8  | 4.39 | 6.21 |
| 7/31/2009  | 2/24/2010  | 10.18 | 6  | 4.39 | 5.79 |
| 3/18/2009  | 3/17/2010  | 10.00 | 12 | 4.32 | 5.68 |
| 5/8/2009   | 4/2/2010   | 10.10 | 10 | 4.43 | 5.67 |
| 8/14/2009  | 4/27/2010  | 10.00 | 8  | 4.45 | 5.55 |
| 9/4/2009   | 5/28/2010  | 10.20 | 8  | 4.45 | 5.75 |
| 7/24/2009  | 5/28/2010  | 10.10 | 10 | 4.44 | 5.66 |
| 12/29/2009 | 6/28/2010  | 10.50 | 6  | 4.50 | 6.00 |
| 1/5/2010   | 8/4/2010   | 10.50 | 7  | 4.41 | 6.09 |
| 8/29/2008  | 8/25/2010  | 9.90  | 24 | 4.12 | 5.78 |
| 11/20/2009 | 9/3/2010   | 10.60 | 9  | 4.35 | 6.25 |
| 4/30/2009  | 9/30/2010  | 9.75  | 17 | 4.31 | 5.44 |
| 3/23/2010  | 11/19/2010 | 10.20 | 8  | 4.11 | 6.09 |
| 12/17/2009 | 11/22/2010 | 10.00 | 11 | 4.25 | 5.75 |
| 2/15/2010  | 12/13/2010 | 10.70 | 10 | 4.19 | 6.51 |
| 3/1/2010   | 12/14/2010 | 10.13 | 9  | 4.16 | 5.97 |
| 2/16/2010  | 12/17/2010 | 10.00 | 10 | 4.19 | 5.81 |
| 6/1/2010   | 12/20/2010 | 10.60 | 6  | 4.00 | 6.60 |
| 6/30/2010  | 12/21/2010 | 10.30 | 5  | 3.98 | 6.32 |
| 5/28/2010  | 12/27/2010 | 9.90  | 7  | 4.02 | 5.88 |
| 7/9/2010   | 1/5/2011   | 10.15 | 6  | 4.02 | 6.13 |
| 4/22/2010  | 1/12/2011  | 10.30 | 8  | 4.09 | 6.21 |
| 4/1/2010   | 1/13/2011  | 10.30 | 9  | 4.14 | 6.16 |
| 5/4/2010   | 3/25/2011  | 9.80  | 10 | 4.18 | 5.62 |
| 5/14/2010  | 3/30/2011  | 10.00 | 10 | 4.18 | 5.82 |
| 6/4/2010   | 4/12/2011  | 10.00 | 10 | 4.20 | 5.80 |
| 12/11/2009 | 4/27/2011  | 10.40 | 16 | 4.33 | 6.07 |
| 6/4/2010   | 5/4/2011   | 10.00 | 11 | 4.21 | 5.79 |
| 6/4/2010   | 5/4/2011   | 10.00 | 11 | 4.21 | 5.79 |
| 9/28/2010  | 6/17/2011  | 9.95  | 8  | 4.35 | 5.60 |
| 9/3/2010   | 7/13/2011  | 10.20 | 10 | 4.30 | 5.90 |
| 6/1/2010   | 8/8/2011   | 10.00 | 14 | 4.22 | 5.78 |
| 1/24/2011  | 8/11/2011  | 10.00 | 6  | 4.37 | 5.63 |
| 5/3/2010   | 9/2/2011   | 12.88 | 16 | 4.18 | 8.70 |
| 11/22/2010 | 9/22/2011  | 10.00 | 10 | 4.25 | 5.75 |
| 4/1/2011   | 10/12/2011 | 10.30 | 6  | 3.95 | 6.35 |
| 3/31/2011  | 11/30/2011 | 10.90 | 8  | 3.78 | 7.12 |
| 3/31/2011  | 11/30/2011 | 10.90 | 8  | 3.78 | 7.12 |
| 6/30/2011  | 12/20/2011 | 10.20 | 5  | 3.40 | 6.80 |
| 11/19/2010 | 12/21/2011 | 10.20 | 13 | 3.98 | 6.22 |
| 4/28/2011  | 12/22/2011 | 9.90  | 7  | 3.62 | 6.28 |
| 6/1/2011   | 12/22/2011 | 10.40 | 6  | 3.51 | 6.89 |
| 6/6/2011   | 12/23/2011 | 10.19 | 6  | 3.50 | 6.69 |
| 7/1/2011   | 1/27/2012  | 10.50 | 7  | 3.32 | 7.18 |
| 7/29/2011  | 2/23/2012  | 9.90  | 6  | 3.17 | 6.73 |

|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
| 6/13/2011  | 5/7/2012   | 9.80  | 10 | 3.33 | 6.47 |
| 6/1/2011   | 5/15/2012  | 10.00 | 11 | 3.35 | 6.65 |
| 5/3/2012   | 6/15/2012  | 10.40 | 1  | 2.83 | 7.57 |
| 12/1/2011  | 6/18/2012  | 9.60  | 6  | 3.05 | 6.55 |
| 7/28/2011  | 7/9/2012   | 10.20 | 11 | 3.11 | 7.09 |
| 11/28/2011 | 9/13/2012  | 9.80  | 9  | 2.94 | 6.86 |
| 3/30/2012  | 10/24/2012 | 10.30 | 6  | 2.85 | 7.45 |
| 3/23/2012  | 11/9/2012  | 10.30 | 7  | 2.86 | 7.44 |
| 2/17/2012  | 11/29/2012 | 9.88  | 9  | 2.90 | 6.98 |
| 2/3/2012   | 12/12/2012 | 9.80  | 10 | 2.91 | 6.89 |
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| 6/1/2012   | 12/14/2012 | 10.40 | 6  | 2.78 | 7.62 |
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| 2/27/2012  | 1/9/2013   | 9.70  | 10 | 2.90 | 6.80 |
| 2/27/2012  | 1/9/2013   | 9.70  | 10 | 2.90 | 6.80 |
| 2/27/2012  | 1/9/2013   | 9.70  | 10 | 2.90 | 6.80 |
| 9/23/2011  | 2/13/2013  | 10.20 | 16 | 2.96 | 7.24 |
| 7/20/2012  | 2/27/2013  | 10.00 | 7  | 2.90 | 7.10 |
| 10/10/2012 | 3/27/2013  | 9.80  | 5  | 3.00 | 6.80 |
| 7/2/2012   | 6/11/2013  | 10.00 | 11 | 2.94 | 7.06 |
| 2/1/2013   | 6/25/2013  | 9.80  | 4  | 3.14 | 6.66 |
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| 3/29/2013  | 11/6/2013  | 10.20 | 7  | 3.47 | 6.73 |
| 4/15/2013  | 11/21/2013 | 10.00 | 7  | 3.53 | 6.47 |
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| 1/11/2013  | 12/4/2013  | 9.50  | 10 | 3.42 | 6.08 |
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| 2/15/2013  | 12/9/2013  | 9.75  | 9  | 3.46 | 6.29 |
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| 12/31/2012 | 12/17/2013 | 9.50  | 11 | 3.43 | 6.07 |
| 3/1/2013   | 12/18/2013 | 9.80  | 9  | 3.49 | 6.31 |
| 6/28/2013  | 12/19/2013 | 10.15 | 5  | 3.74 | 6.41 |
| 3/1/2013   | 12/30/2013 | 9.50  | 10 | 3.51 | 5.99 |
| 12/12/2012 | 3/26/2014  | 9.96  | 15 | 3.47 | 6.49 |
| 4/9/2014   | 6/6/2014   | 10.40 | 1  | 3.43 | 6.97 |
| 12/2/2013  | 7/31/2014  | 9.90  | 8  | 3.58 | 6.32 |
| 12/20/2013 | 8/25/2014  | 9.60  | 8  | 3.52 | 6.08 |
| 5/2/2014   | 10/9/2014  | 9.80  | 5  | 3.30 | 6.50 |
| 12/16/2013 | 11/6/2014  | 9.56  | 10 | 3.44 | 6.12 |
| 4/1/2014   | 11/6/2014  | 10.20 | 7  | 3.30 | 6.90 |
| 5/30/2014  | 11/14/2014 | 10.20 | 5  | 3.23 | 6.97 |
| 3/31/2014  | 11/26/2014 | 9.70  | 8  | 3.28 | 6.42 |

|            |            |       |    |      |      |
|------------|------------|-------|----|------|------|
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| 2/13/2014  | 12/4/2014  | 9.68  | 9  | 3.33 | 6.35 |
| 6/10/2014  | 12/11/2014 | 10.07 | 6  | 3.18 | 6.89 |
| 5/30/2014  | 12/12/2014 | 10.20 | 6  | 3.19 | 7.01 |
| 4/30/2014  | 12/18/2014 | 9.83  | 7  | 3.21 | 6.62 |
| 3/3/2014   | 1/23/2015  | 9.50  | 10 | 3.21 | 6.29 |
| 5/1/2014   | 3/25/2015  | 9.50  | 10 | 3.02 | 6.48 |
| 7/3/2014   | 4/29/2015  | 9.53  | 10 | 2.89 | 6.64 |
| 6/30/2014  | 5/26/2015  | 9.75  | 11 | 2.90 | 6.85 |
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| 1/2/2015   | 9/10/2015  | 9.30  | 8  | 2.79 | 6.51 |
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| 5/29/2015  | 12/3/2015  | 10.00 | 6  | 2.98 | 7.02 |
| 12/8/2014  | 12/17/2015 | 9.70  | 12 | 2.83 | 6.87 |
| 6/1/2015   | 12/18/2015 | 9.50  | 6  | 2.98 | 6.52 |
| 3/2/2015   | 12/30/2015 | 9.50  | 10 | 2.90 | 6.60 |
| 2/9/2015   | 1/6/2016   | 9.50  | 11 | 2.89 | 6.61 |
| 4/24/2015  | 2/23/2016  | 9.75  | 10 | 2.93 | 6.82 |
| 12/29/2014 | 3/16/2016  | 9.85  | 14 | 2.82 | 7.03 |
| 10/1/2015  | 7/18/2016  | 9.98  | 9  | 2.72 | 7.26 |
| 1/4/2016   | 8/9/2016   | 9.85  | 7  | 2.57 | 7.28 |
| 5/5/2015   | 8/18/2016  | 9.50  | 17 | 2.77 | 6.73 |
| 8/27/2015  | 9/28/2016  | 9.58  | 13 | 2.66 | 6.92 |
| 4/8/2016   | 11/9/2016  | 9.80  | 7  | 2.44 | 7.36 |
| 5/1/2015   | 12/1/2016  | 10.00 | 19 | 2.73 | 7.27 |
| 5/3/2016   | 12/19/2016 | 9.37  | 7  | 2.52 | 6.85 |
| 6/6/2016   | 12/22/2016 | 9.60  | 6  | 2.51 | 7.09 |
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| 8/25/2016  | 5/18/2017  | 9.50  | 8  | 2.86 | 6.64 |
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| 8/25/2017  | 6/22/2018  | 9.90  | 10 | 2.95 | 6.95 |



|            |            |       |    |      |      |
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| 5/24/2018  | 9/14/2018  | 10.00 | 3  | 3.04 | 6.96 |
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| 12/21/2017 | 10/31/2018 | 9.99  | 10 | 3.08 | 6.91 |
| 5/1/2018   | 12/13/2018 | 9.30  | 7  | 3.15 | 6.15 |
| 2/15/2018  | 12/14/2018 | 9.50  | 10 | 3.14 | 6.36 |
| 4/13/2018  | 12/21/2018 | 9.30  | 8  | 3.15 | 6.15 |
| 5/14/2018  | 1/9/2019   | 10.00 | 8  | 3.14 | 6.86 |
| 5/9/2018   | 2/27/2019  | 9.75  | 9  | 3.12 | 6.63 |
| 9/26/2018  | 3/14/2019  | 9.40  | 5  | 3.16 | 6.24 |
| 9/28/2018  | 4/30/2019  | 9.73  | 7  | 3.11 | 6.62 |
| 9/28/2018  | 4/30/2019  | 9.73  | 7  | 3.11 | 6.62 |
| 11/8/2018  | 5/1/2019   | 9.50  | 5  | 3.06 | 6.44 |
| 7/6/2018   | 5/2/2019   | 10.00 | 10 | 3.10 | 6.90 |
| 11/8/2018  | 5/8/2019   | 9.50  | 6  | 3.05 | 6.45 |
| 9/21/2018  | 5/23/2019  | 9.90  | 8  | 3.09 | 6.81 |
| 3/28/2019  | 10/31/2019 | 10.00 | 7  | 2.49 | 7.51 |
| 3/28/2019  | 10/31/2019 | 10.00 | 7  | 2.49 | 7.51 |
| 9/21/2018  | 11/7/2019  | 9.35  | 13 | 2.79 | 6.56 |
| 6/10/2019  | 11/29/2019 | 9.50  | 5  | 2.30 | 7.20 |
| 4/22/2019  | 12/19/2019 | 10.25 | 8  | 2.41 | 7.84 |
| 4/22/2019  | 12/19/2019 | 10.20 | 8  | 2.41 | 7.79 |
| 4/22/2019  | 12/19/2019 | 10.30 | 8  | 2.41 | 7.89 |
| 2/28/2019  | 12/20/2019 | 9.45  | 9  | 2.50 | 6.95 |
| 6/3/2019   | 12/24/2019 | 9.50  | 6  | 2.31 | 7.19 |
| 6/24/2019  | 1/23/2020  | 9.86  | 7  | 2.28 | 7.58 |
| 4/12/2018  | 2/6/2020   | 10.00 | 22 | 2.79 | 7.21 |
| 5/20/2019  | 2/11/2020  | 9.30  | 8  | 2.32 | 6.98 |
| 4/30/2019  | 3/25/2020  | 9.40  | 11 | 2.26 | 7.14 |
| 9/3/2019   | 4/27/2020  | 9.25  | 7  | 1.99 | 7.26 |
| 7/8/2019   | 5/8/2020   | 9.90  | 10 | 2.02 | 7.88 |
| 7/1/2019   | 5/20/2020  | 9.45  | 10 | 2.01 | 7.44 |
| 8/14/2019  | 7/1/2020   | 9.25  | 10 | 1.87 | 7.38 |
| 6/20/2019  | 7/8/2020   | 9.40  | 12 | 1.96 | 7.44 |
| 12/3/2018  | 8/27/2020  | 10.00 | 21 | 2.22 | 7.78 |
| 6/1/2020   | 8/27/2020  | 8.20  | 2  | 1.38 | 6.82 |



SUMMARY OUTPUT

| <i>Regression Statistics</i> |      |
|------------------------------|------|
| Multiple R                   | 0.87 |
| R Square                     | 0.76 |
| Adjusted R Square            | 0.76 |
| Standard Error               | 0.81 |
| Observations                 | 1033 |

| ANOVA      |           |           |           |          |                       |
|------------|-----------|-----------|-----------|----------|-----------------------|
|            | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>Significance F</i> |
| Regression | 1         | 2116.80   | 2116.80   | 3218.10  | 0                     |
| Residual   | 1031      | 678.17    | 0.66      |          |                       |
| Total      | 1032      | 2794.97   |           |          |                       |

|               | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i> | <i>Upper 95%</i> | <i>Lower 95.0%</i> | <i>Upper 95.0%</i> |
|---------------|---------------------|-----------------------|---------------|----------------|------------------|------------------|--------------------|--------------------|
| Intercept     | 7.8585              | 0.0642                | 122.3511      | 0.0000         | 7.7324           | 7.9845           | 7.7324             | 7.9845             |
| Interest Rate | -0.3969             | 0.0070                | -56.7283      | 0.0000         | -0.4106          | -0.3832          | -0.4106            | -0.3832            |

|  |      |
|--|------|
| Average Interest Rate for last 9 months: | 1.44 |
| Risk Premium                             | 7.29 |
| Expected Return                          | 8.73 |

**DOMINION ENERGY SOUTH CAROLINA, INC.**  
**UNITED STATES DEPARTMENT OF DEFENSE AND ALL OTHER FEDERAL EXECUTIVE AGENCIES' FIFTH SET**  
**OF WRITTEN INTERROGATORIES AND REQUEST FOR PRODUCTION OF DOCUMENTS AND THINGS**  
**DOCKET NO. 2020-125-E**

**REQUEST 5-2:**

DE made equity infusions to DESC in 2019.

- a. Please state the amount of total equity infusion in 2019.
- b. Was the equity infusion the result of additional stock offering by DE or of additional debt issuance by DE?
- c. What is the total amount of DE's stock issuance in 2019? What is the total amount of DE's stock issuance in 2019?
- d. Please provide a breakdown of the amount of the equity issuance cost of DE in 2019, including the cost of equity issuance targeting for DESC if there is any.
- e. Please explain the accounting treatment of the equity issuance cost by DE.

**RESPONSE NO. 5-2:**

- A. The capital structure in this case includes \$825M of equity that was provided by Dominion Energy to DESC.
- B. No Dominion Energy capital or debt issuances specifically targeted a use of proceeds to infuse equity to DESC.
- C. Dominion Energy issued 157,077,499 shares of common stock and 16,900,000 shares of preferred stock in 2019. Through the third quarter of 2020, Dominion has issued 6,338,459 shares of common stock.
- D. In 2019, Dominion Energy had \$22,098,729 in issuance costs tied to common stock and \$23,330,953 in issuance costs tied to preferred stock. No costs of equity issuances in 2019 were associated with DESC.
- E. As mentioned in d., no costs of equity issuances are being included for recovery in this case. In general, the issuance expense is netted with the gross proceeds for the balance sheet. The applicable accounting guidance is ASC 340-10-S99-1.